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Report of the Chief of the Forest Service, 1957



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ROCKY MOUNTAIN STATION

United States Department of Agriculture

UNITED STATES DEPARTMENT OF AGRICULTURE,
FOREST SERVICE,
Washington, D. C., October 24, 1958

Hon. EZRA TAFT BENSON,
Secretary of Agriculture.

DEAR MR. SECRETARY:

This is my annual report for 1957. Against a background of general progress, several advances were notable.

Among these: (1) a record volume of timber cut; (2) a sharp rise—even greater than predicted—in recreation visits to national forests; (3) the most trees ever planted in a single year; (4) best fire control year on record; and (5) steady progress in research.

Through improved management, nearly 7 billion board-feet of timber was cut from national forests. This was slightly above 1956, and double the 1950 volume. Timber sales receipts totaled \$102,779,129.

National forests as a recreation mecca are being explored by more Americans each year. The 61 million visits in 1957 were 8 million more than estimates in 1955 had forecast. To cope with some of this expanded use, "Operation Outdoors" was started.

For the first time in any one year, a billion trees were planted—860 million of them on non-Federal land. This is significant progress toward the big job ahead. Within the next 10 years 48 billion trees need to be planted, mainly on small ownerships, if the wood requirements of a larger population are to be met by the year 2000. Plans were being made to explore ways of improving management of small ownerships as an opportunity for the farm woodlot to add to farm income.

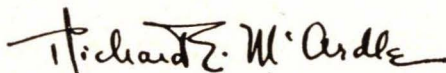
It was a banner year for fire control. There were 3.2 million fewer acres burned than in the previous year. Area burned—both public and private land—was 3.4 million acres, below the 4 million mark for the first time. Compared to 6.6 million acres burned in 1956, the reduction was nearly half. Total number of fires reached an all-time low. The 83,400 fires this year marked the first time the number was held under 100,000. It was a 42-percent reduction.

Among the many research results were new uses and markets for waste-wood; new chemicals from wood; improved aircraft-chemical attack on fires; increased water yields; and better protection of forests from diseases, insects, and fire.

Pressures from bigger populations bring taxing problems in all Forest Service work. Yet we look on the problems as opportunities from which all will gain. We hope that with greater public use of forest lands will come new respect for all natural resources.

The conservation of forest resources—water, forage, and wildlife as well as wood—is essential to the welfare of the people and the strength of the Nation. When this truth is fully grasped, I believe the American people will even more wholeheartedly support and cooperate in all efforts to build up, use wisely, and enhance this natural wealth.

Sincerely yours,



RICHARD E. MCARDLE
Chief, Forest Service

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This Report Covers Calendar Year Activities Unless Otherwise Identified. Where Records are on a Fiscal Year Basis, They are so Reported.

Report of the Chief of the Forest Service, 1957

Cooperation—State and Private Forestry

Congress has provided for the Federal Government to help private forest-land owners plant, grow, protect, and market trees. Under the Weeks Law, the Clarke-McNary Act, the Forest Pest Control Act, and other Federal laws, the Forest Service works with State Foresters to assist private owners in many ways.

A record 1 billion trees were planted in the United States in 1957, with 860 million or 86 percent of this on non-Federal lands. Area planted was more than a million acres, double the acreage planted in 1950.

Despite this increase in the planting rate, about 48 million acres, most of which is privately owned, still needs to be planted. This tremendous planting job should be done within the next 10 years if these now idle acres are to produce their part of the timber the Nation will need by the year 2000.

Forest fires on State and private lands were held to a record low in 1957. There were encouraging reductions in total number of fires, area burned, and man-caused fires.

The progress in cooperative forestry—aiding States and private landowners—was gratifying. But the pace is too slow. More than half of the Nation's commercial forest land is in some 4½ million farm and other small ownerships. It is in this field that America faces its biggest forestry opportunity. It is largely to privately owned woodlands that an enlarging population must look for its future wood.

TREE PLANTING

Under the Agricultural Act of 1956, tree planting activities were considerably expanded to help States and private owners reforest their land.

Conservation Reserve

Through April 15, 1957, the final date for signing Conservation Reserve contracts that began in 1957, farmers agreed to plant trees and shrubs on approximately 536,000 acres. Since then, increased interest has been shown in signing contracts for tree planting that will start in 1958. This was partly due to the broadening of the Con-

servation Reserve part of the Soil Bank program. Because of increased payments, farm owners can more profitably put whole farm units under the program.

To inform farmers of the benefits they will receive from participating in this cooperative tree planting program, the Forest Service made a film entitled "Tree Bank," which received national distribution and showing before TV and other audiences. In addition, the following items were produced and widely distributed: a poster, "Like Money in the Bank," and a brochure, "Grow Trees." A packaged TV program, "Grow Trees in Your Soil Bank," was distributed to 400 outlets. The Department of Agriculture distributed radio tapes and scripts describing the tree-planting program.

In 1957 State forestry agencies in 38 States furnished planting stock, technical forestry assistance, or both, under cooperative Conservation Reserve agreements. Other States furnished planting stock and service through other programs.

To meet anticipated needs for planting stock, expansion of State nursery capacity was nearly completed. Forty-five State nurseries were expanded and 16 new ones were nearing completion. State nurseries produced 200 million more seedlings than they did in 1956. Cooperating State forestry agencies also arranged for private and other public nurseries to furnish planting stock for this program.

Cooperating State forestry agencies furnished technical forestry assistance to participating farmers and to Agricultural Stabilization and Conservation Committees. States were reimbursed, under the Soil Bank program, for the cost of 60 man-years of this assistance. In addition, State forestry agencies contributed about 30 man-years to the tree planting program.

Assistance to States

On July 1, 1957, under Title IV, Agricultural Act of 1956, \$500,000 became available for forestation on commercial forest land. Money used for this purpose had to be matched by expenditures of cooperating States. By the end of the year 8

States were cooperating in this program and 11 other States were planning to participate. Through this program nonstocked and understocked commercial forest land can be put back into tree production.

Nursery Stock

Production of seedlings under the Clarke-McNary Act reached a new high in fiscal 1957. The output was 712 million plants, 5 times the number produced 7 years ago. This record production was the result of expansion in State and privately owned nurseries. An annual output of 1 billion seedlings under this program is expected within 2 or 3 years.

Kansas joined the program during the year, bringing the total of cooperating States to 45 plus Hawaii and Puerto Rico. Nevada is planning to enter the program soon.

The Federal Government contributed \$819,713, and the States \$1,656,667.

Cost of planting stock is held down by using mass production methods and newly developed techniques. The average sale price was \$4.92 per thousand in 1957.

FOREST MANAGEMENT

Kansas, Nebraska, and Nevada entered the cooperative forest management program in fiscal year 1957. During the year the largest number of small owners in the history of the program was helped. Farmers and other small owners in about 1,400 counties in 44 States and Puerto Rico received technical forestry assistance. About 1,000 counties with small woodlands are still without this service.

The number of service or farm foresters increased from 285 in fiscal 1956 to 314 in 1957. They assisted 44,494 small owners to better manage 3 million acres of woodland. Owners received nearly 12 million dollars from the sale of some 538 million board-feet of wood harvested. In addition, young trees on 203,932 acres were saved from premature harvest. In fiscal 1957, 5,533 small processors of forest products were assisted.

The Federal Government's share in this cooperative endeavor, aimed at 4½ million small owners and some 50,000 small forest products processors, was \$1,000,000. The States contributed \$1,503,299.

General Forestry Assistance

Technical forestry assistance was provided to Federal, State, community, and private agencies as well as to forest industries, colleges and universities, and large forest-land owners. Hardwood utilization schools were held in the South to inform State, industrial, and consulting foresters and forestry school professors on the latest techniques of log grading, utilization, and forest management.

Naval Stores Conservation

In cooperation with the Agricultural Conservation Program Service, the Forest Service continued the Naval Stores Program. In 1957, 2,598 producers, 59 percent of the total, participated. They worked 28.6 million acres, 84 percent of the entire crop.

Continuous Forest Inventory

Large landowners are making greater use of continuous forest inventory (CFI) in managing their forests. This system of inventory, which the Forest Service helped to develop, combines modern concepts of statistical analysis with simplified but precise field measurements and high-speed machine computation. Results furnish the forest owner and manager with the information they need to keep their forests perpetually productive.

Last year 20 large forest-land owners (State, county, and private) received help from the Forest Service in applying CFI techniques on several million acres. Some 25 large owners were already using the method. More than 100 individuals, companies, and organizations interested or involved in CFI received current information on CFI work.

The Forest Service conducted CFI training schools in Milwaukee, Wis.; College Station, Texas; and on lumber and pulp company forest properties in several States.

FIRE CONTROL—STATE AND PRIVATE LANDS

State and privately owned forest land had about 42 percent fewer fires in 1957 than in 1956. Area burned was 48 percent less—3.2 million acres compared with 6.2 million acres in 1956. These reductions reflect the stepped-up and expanded protection program and intensified fire prevention campaign.

Twenty-three percent of the total number of fires on State and private lands occurred on the 9 percent of forest land that is not under organized protection. Fire burned 5.46 percent of the unprotected land and only 0.28 percent of the protected area; unprotected land thus burned at a rate 20 times that of protected forest land.

In the Cooperative Fire Control Program, the Forest Service cooperates with 44 States and Hawaii in protecting 395,864,000 acres of State and privately owned forest land, potential forest acres, and nonforested critical watersheds. This is 5,940,000 acres more than in 1956. Some 39 million acres, about 9 percent of the total, remain without organized protection. Plans were made for Nebraska to enter the program. It is expected that Wyoming will soon complete an agreement for control of fires. Arizona and Kansas will then be the only States without fire control programs.

State and private forestry work was reorganized

to provide more effective guidance for cooperative programs in New Mexico, Nevada, Utah, and south Idaho.

Severe Fires in Northeast

While the 1957 overall fire record was very good, some areas had severe fires. The spring fire season in the Northeastern States was one of the driest on record. Fire danger ranged from 200 to more than 400 percent above normal in April and May. The New England States had 40 percent more fires than in 1956. In May the situation was so acute that the Governors of New York and the New England States simultaneously closed the forests to use.

Aerial Fire Fighting

The States had 135 aircraft available for forest fire control operations in 1957. Both fixed-wing airplanes and helicopters were used for detection, reconnaissance, and transportation of overhead cargo and fire fighters. Chemical retardants were used to fight fires on State and private forest land in many parts of the country.

Area and Cost Estimates

In March 1957 State forestry agencies completed an area and cost summary of protection needs on State and privately owned forest land in 46 States and Hawaii. No estimates were prepared for Arizona and Kansas. The area requiring protection is 435 million acres, and the estimate of what the public programs would cost is 83.5 million dollars per year.

Battelle Study

A contract was signed with Battelle Memorial Institute for a study of the Cooperative Fire Control Program. Aim of the study is to determine the values of resources being protected and the protection cost justified by the values; develop guides for Federal, State, and private sharing of costs; determine criteria for sharing; and make general recommendations for conducting the program. The study will be completed in 1958.

Protection Compacts

The Forest Service agreed to serve as secretary to the Southeastern and South Central Interstate Forest Fire Protection Compacts. In addition, the Forest Service provides technical guidance to all four interstate forest fire protection compacts, including Middle Atlantic and Northeastern compacts.

COOPERATIVE FOREST FIRE PREVENTION

Under the popular Smokey Bear symbol, the 1957 campaign was one of the most successful in the 16-year history of this nationwide cooperative program. Both the number of fires and area

burned reached the lowest figures on record. For the first time annual number of fires was below 100,000 (83,392), and area burned was under 4 million acres (3,409,038).

Most of these reductions were in the 11 Southern States from Virginia to Texas. Compared to 1956, number of fires for the Nation was reduced by 60,093. The South accounted for 58,598 of this decrease—a 57 percent drop. Area burned throughout the country was reduced by 3.2 million acres from the previous year, and about 3 million of this was in the South.

The CFFP program covers all forest land in the United States, public and private. Supported jointly by the Association of State Foresters and the Forest Service, it is under sponsorship of the Advertising Council, Inc. Its aim is to prevent man-caused fires.

During the year the Canadian Forestry Association began a similar program with Smokey Bear as its symbol. Canadian copyright was issued to restrict the use of this renowned symbol to forest fire prevention.

A revised Junior Forest Ranger kit was sent to 600,000 new members who wrote in for it. In addition, every Cub Scout in America (1,400,000) received membership cards. Total membership since 1953 now stands at over 3 million boys and girls.

Smokey's forest fire prevention message was dramatically carried to 50,000 boys attending the Boy Scout Jamboree at Valley Forge, Pa., through exhibits, posters, and personal appearances by three Smokey impersonators.

Radio and television coverage increased. Three new television shorts in the "Smokey Bear-Little Boy" animated series were produced and distributed to 550 stations. Television time donated for public service fire prevention messages had an estimated value of 4 million dollars. One radio station reported broadcasting 7,200 fire prevention messages; others broadcast nearly as many.

In the Smokey commercial educational program, licenses for 10 new products were issued, and total royalties from licensed commercial products came to \$20,000 for the year.

PEST CONTROL

The Forest Service is responsible for making forest pest surveys, controlling pests on national forests, providing leadership and cooperating in control programs on State and private lands, and giving technical assistance to other Federal agencies in control programs.

Forest Diseases

Disease control work included salvage logging, special cutting practices, and timber stand improvement. In addition, cooperative programs to control white pine blister rust and oak wilt were carried out.

White pine blister rust is controlled by eradicating ribes (currant and gooseberry bushes), the

rust's alternate hosts. For the fourth consecutive year, States, counties, towns, and private landowners increased contributions of funds and services for control of blister rust on State and private lands. They contributed \$743,437 in 1957. Twenty-one States participated in the program; 5 of them assumed more responsibility for management of the control projects. In California, 11 more private forest-land owners signed cooperative agreements; this brought the total cooperating landowners in that State to 76. More than 6 million ribes plants were removed from 450,357 acres of State and private land. Eighteen percent of this acreage was land not previously treated for blister rust control.

Control of white pine blister rust was also carried on in 30 national forests in 6 Forest Service Regions. Most of the national-forest land selected for protection from this disease is in the West. More than 7.3 million ribes plants were eradicated from 132,794 acres of national-forest land.

The Forest Service provided technical direction and leadership to the Department of the Interior blister rust control program, which included projects on 8 national parks, 4 Indian reservations, and 1 Bureau of Land Management district. Control work was started in Grand Teton National Park, to protect limber pine growing at important viewing points developed under the National Park Service Mission 66 program. On 34,722 acres of Interior lands, more than 1.4 million ribes plants were destroyed.

Oak wilt is a serious threat to the forests in the East and Midwest. Five States have applied for and received Federal financial aid to control this disease. Pennsylvania, West Virginia, Virginia, North Carolina, and Kentucky carried on cooperative survey and control programs on State and private lands. The Forest Service made surveys and did necessary control work on national forests in Virginia and West Virginia.

In 1957, 1,461 oak wilt infection centers were located; 4,082 oak trees were treated. An estimated 36 million acres were surveyed by airplane to locate these infection centers. Thus far, control efforts have been confined to the eastern and southern boundaries of the area affected by oak wilt. The purpose is to keep the disease from spreading eastward and southward.

Forest Insects

Under cooperative agreements, 20 forest insect control projects were carried on in 18 States. Numerous other control projects were conducted by the Forest Service, the Department of the Interior, States, private industry, and individuals.

An estimated 1.2 billion board-feet of infested, dead, down, and pest-susceptible timber was logged to control or prevent insect epidemics. On Federal land, 312,000 bark-beetle-infested trees were treated; timber stands on almost 1.5 million acres in Montana and Idaho were sprayed with

chemicals from airplanes to control defoliators such as spruce budworm; and trees on 11,300 acres were treated for miscellaneous forest insects.

Cooperative insect control work included the treatment of 14,600 bark-beetle-infested trees; the application of aerial chemical spray to 93,447 acres of timber stands, to control defoliators; and the control of miscellaneous insects on 15,600 acres.

FLOOD PREVENTION

Under Public Laws 566 (83d Congress) and 1018 (84th Congress), the Forest Service helps local organizations plan and install programs for watershed protection and flood prevention.

Working cooperatively with the State Foresters, the Forest Service assisted the Soil Conservation Service and local sponsors in planning improvement programs on 195 small watersheds during 1957. Included are 49 of 73 projects approved for planning in 1957 and 146 of 237 previously approved projects.

Work plans were approved and installations authorized on 29 projects, of which 20 include stepped-up programs for improvement of forest lands. On 14 additional watersheds, work plans were completed. Seven of these project plans include forestry measures.

Tentative work plans were prepared for 33 other watersheds, with Forest Service and State Forester assistance on 26.

Interagency Studies

Potential impacts of reservoirs proposed by the Corps of Engineers and the Bureau of Reclamation in the Columbia River Basin were determined. This included appraisal of the probable effect of these developments upon national forests and future uses of other forest lands.

The Forest Service determined the forest-land impacts and worked with other U. S. Department of Agriculture agencies in reappraising the agricultural benefits of five Bureau of Reclamation projects authorized under the Upper Colorado River Storage Project Act.

A study of the impact of the Hartnell Dam project upon forest lands in the vicinity of Clemson College was completed.

The agricultural and forest-land aspects of water control and water supply requirements in the Delaware River Basin were evaluated.

Plans were made to participate in a study of the land aspects of the flood control needs of the Potomac River Basin.

Work was started on the agricultural and forest-land aspects of the Cape Fear River flood control program in North Carolina.

Demonstration Projects

This program calls for installing watershed improvement and flood prevention measures on 58 selected small watersheds located throughout the Nation. Cooperating with the Soil Conservation

Service, State Foresters, and local project sponsors, the Forest Service handles the forest-land aspects of the program. Forestry measures were carried out on 36 of the watershed projects, four of which involve national-forest land. State forestry agencies assisted in applying forestry measures on 32 of the pilot watersheds.

Private landowners planted 2,538,000 trees on 2,539 acres. Technical forestry assistance was provided 873 owners of forest land. Protection from forest fire was extended to 19,000 acres not previously under protection. Seventy-four hundred and twenty acres of farm woodland was placed under protection. Accomplishments on national-forest land include gully control and soil stabilization work on 4,398 acres, erosion control work on 50 miles of forest roads, and the construction of 12 miles of fence to control the use of critically eroding forest rangelands.

Flood Control

Work was continued on 6 of the 11 watersheds on which watershed treatment and upstream flood prevention activities have been authorized. During 1957 a total of 38½ million trees were planted on 40,000 acres of severely eroding lands. Technical forestry assistance was given to 1,734 owners of woodland. Fire prevention and control efforts were increased on 450,000 acres of valuable watershed lands. Fire control measures included building 58 miles of trails into inaccessible areas, 35 miles of firebreaks, and 111 landing spots for helicopters.

Emergency Projects

Emergency flood-prevention measures were installed on 8 burned-over areas of national-forest

land in southern California. In cooperation with local, State, or other Federal agencies 79,278 acres of watershed lands were sown by helicopter or airplane to grasses and other plants. This was done to reduce the hazard of flash floods that could endanger lives and damage or destroy property downstream.

RURAL DEVELOPMENT

The Forest Service cooperates with other agencies in the Department of Agriculture and other public and private agencies on rural development problems. Activities include (1) encouraging the development of new forest industries, (2) providing technical assistance to forest products processors, and (3) helping landowners manage their forests.

New Industries

Local or regional groups and State planning and development agencies sponsor programs to show industrialists that timber and other needed resources and facilities are available, and to interest them in establishing plants. The Forest Service and State forestry departments prepare the information on forest resources. The Timber Resource Review provides basic data on timber supplies. Sponsors publish the information and distribute it to industrialists and possible investors.

Processors

Through the Cooperative Forest Management program, Forest Service specialists give in-the-mill advice to owners, operators, and managers of small processing plants. Assistance includes suggestions for more effective operations, reduction of waste, and manufacture of higher quality product.

Forest and Range Research

Wherever forestry progresses, wherever people profit from forestry, research plays a role, leading the way. Its basic aim is to make America's public and private forest resources more useful and profitable to all.

Forest Service research seeks to breed and grow better crop trees; protect forests from insects, disease, and fire; improve watersheds; find new products to be made from wood and new ways of using more of the tree; explore the economics of forestry; improve rangelands and wildlife habitat; and enhance recreation and scenic values of the Nation's forests.

These scientific studies are carried on at the central Forest Products Laboratory, Madison, Wisconsin; at nine regional experiment stations and various research centers including experimental forests and ranges.

To a large extent the research is cooperative with States, other Federal agencies, private organizations, industries, and individuals. Find-

ings are published and made available to the public through numerous publications and reports.

DISEASES

Total forest loss from disease—in decay, growth reduction, mortality, and lowered quality—exceeds that of any other destructive agent. To reduce this loss and avert major disasters, research is directed toward finding sound means of disease control. Effort is concentrated on those which from time to time become epidemic. Currently rated as epidemic are oak wilt, pole blight of western white pine, Hypoxylon canker of aspen, white pine blister rust, and Elytroderma needle blight of ponderosa pine.

Oak Wilt

There has been no recent extension of the known range of oak wilt. Experiments in the Southeast indicate that sanitation—cutting infected trees

and spraying the slash with insecticide—is an effective method of control. In sampled uncontrolled areas in the Lake States new oak wilt infection centers have become established at a relatively uniform rate over the last 3 years. Studies in Missouri show that the mortality rate in infected white oaks is much lower than in red oaks.

Pole Blight

Pole blight affects pole-size western white pine and is causing mortality ranging from 10 to 80 percent over the 95,000 acres affected in the northern Rocky Mountains. Research has shown that this disease increases in severity as soil moisture becomes less available. It does not occur in stands growing on deep soils with available moisture storage capacities in excess of 5.0 inches. Land managers can now concentrate white pine production on sites least subject to pole blight, leaving more hazardous sites to other species.

Hypoxylon Canker

Hypoxylon canker continues to kill 1 to 2 percent of the total aspen volume in the Lake States annually, which means losses may be as great as 1,400,000 cords a year. Research findings show that the amount of infection and damage is greatly influenced by stand density. Maintaining well-stocked stands helps to control this disease. Determination of the optimum level of stocking is the subject of continuing research.

White Pine Blister Rust

Detailed studies of microclimatic factors make it possible to identify localized areas where white pine blister rust control efforts may be relaxed, others where control effort must be intensified, and still other areas where effective control may be virtually impossible. Studies of a broader geographic area show that the intensity of the summer dry period as one proceeds southward on the Pacific slope reduces the incidence of periods favorable for rust. When weather favorable to the disease does occur, however, infection may still be heavy and damaging.

Cooperative investigations are being made to find new ways of reducing costs of white pine blister rust control. In 1957 a forest genetics project was launched in cooperation with the University of Idaho, to develop and produce white pine planting stock resistant to blister rust. Tests made in cooperation with a drug manufacturer proved that an antibiotic, Actidione, would destroy blister rust infections on western white pine. Use of this drug may prove to be a safe, valuable supplemental means of control, but to prevent reinfection, ribes plants must be removed.

Various cutting and burning methods for reducing ribes regeneration were evaluated. Attempts were made to develop more effective chemical formulations to kill ribes plants. Analysis of methods of eradicating ribes plants resulted in changes in

work procedure in north Idaho in 1957; this increased accomplishments almost one-third. Other studies included analyzing effects of local climate on rust behavior. Results of these cooperative studies indicate that it will be possible to further reduce costs of control.

Needle Blight—Ponderosa Pine

Cutting in Elytroderma-blighted ponderosa pine stands of merchantable size should be avoided unless severe loss is imminent. If it is necessary to cut, all but the most vigorous trees should be removed. These recommendations are based on studies made in the ponderosa pine subregion of the Pacific Northwest. The studies show that mortality of ponderosa pine residuals is much greater after salvage cuts in severely blighted stands than after ordinary partial cuts in uninfected stands.

INSECTS

Though diseases cause most overall forest loss, insects rank first as a killer of sawtimber and growing stock, according to the Timber Resource Review. Insects kill about twice as much sawtimber and growing stock as disease, and seven times as much as fire. Efforts continued during the year to keep this destruction as low as possible.

Virus Sprays Control Pine Sawfly

Infestations of European pine sawfly can be controlled with virus sprays applied by aircraft. This was found through cooperative tests by entomologists in Canada and the United States. The spray is made from sawfly caterpillars killed by the virus. A virus spray can also be used to combat the Virginia pine sawfly.

Seedling Damage Reduced

Pine seedlings in the South are sometimes severely damaged by weevils. This occurs where seedlings are planted soon after stands have been removed by cutting or wildfire and trees are allowed to reseed naturally. Recent studies show that weevil damage in plantations can be reduced by (1) allowing 9 months to elapse after cutting or burning before planting, or (2) where planting is to be done immediately after cutting or burning, dipping seedling tops in a water suspension of benzene hexachloride or aldrin emulsion. Losses can be reduced in naturally seeded areas by cutting trees to coincide with seed fall.

Insect Predators

One way of controlling forest insects is to introduce harmless insects that naturally prey on the harmful ones. For example, about 10,000 fly-like predators of the balsam woolly aphid were brought in from Canada, by arrangement with the Canada Department of Agriculture.

The balsam woolly aphid, accidentally intro-

duced from Europe, threatens valuable stands of Pacific silver fir. The epidemic was discovered in 1954. Originally from Yugoslavia, the predator was introduced in the infested area of the State of Washington in the hope that it can be successfully established there.

Yellow-Poplar Borer

Many mature yellow-poplars in western Kentucky have been killed by a boring insect which girdled them at the ground line. Spraying the tree trunks with an oil solution of benzene hexachloride and DDT has proved an effective control. This method also prevents new attacks.

FIRES

Research on protection of forest, range, and watershed lands from fire is directed toward reducing losses, more efficient fire control, and learning how to use fire in managing forest and related lands.

How to reduce the large number of man-caused fires was under study. Explorations on reducing severity of fire-setting lightning storms were continued. Special attention is being given to understanding the behavior of large fires, and improving attack through the use of chemicals, airplanes, helicopters, and other devices. Study is concentrated on prescribed burning—using fire to reduce fuel and control or modify unwanted plant cover.

Aircraft-Chemical Attack

Research continued to concentrate on ways to improve the striking power of fire-fighting forces, through faster and more effective attack. Of the many measures tried to date, the use of aircraft in direct support of ground fire fighting forces has shown the most promise. Cooperative activity in the development of supplemental equipment and methods has continued at a high level through active participation and trial use in California by both State and Forest Service fire fighting agencies.

Methods used so far depend on the use of tanker planes to drop a fire retardant chemical mixture on fuels into which the fire is spreading, and on the use of helicopters to give additional support to ground operations. The most successful mix for tanker planes has been sodium calcium borate in water. Called "borate slurry," it is somewhat like pancake batter. When dropped from the air, it clings to and, in effect, fireproofs vegetation, cooling the fire down so that ground forces can get control. The white coloring of the chemical enables airplane pilots to see where the mix has been placed. Because the fire-retarding effect lasts for days—much longer than water—the mixture can be used to build an effective chemical line ahead of the fire.

The Helitack program has the same objectives and is a part of this overall effort. It involves experiments in using helicopters for such work as

laying fire hose over rough terrain, and delivering water, equipment, and fire fighters without landing. In this work the Corps of Engineers is cooperating with the Forest Service and the State of California.

Western Air Attack Review, a special conference and demonstration, was held at Redding, Calif., in April. It was sponsored jointly by the Forest Service and the California Division of Forestry. The objective was to speed up the dissemination of information among forest fire control agencies on the potential of aerial attack and on the progress made to date in development of equipment, methods, and techniques for its application.

One outcome of the meeting was the trial use of aircraft and chemicals in forest fire problem areas of the Pacific Northwest and Intermountain Regions with encouraging results. Plans were completed for test trials of the aircraft-chemical attack on fires in Southern States in 1958.

Although air attack with both fixed-wing aircraft and helicopters has already had considerable success in practice, the method is expensive and still has many limitations. Systematic research and development work remains to be done before its full potential in reducing fire losses throughout the country can be realized.

Weather Influence

One research project produced equations which will help predict fire behavior. These equations when perfected can be codified to warn in advance whether local wind will dominate and continue to drive a fire or whether convective energy of the fire itself will become strong enough to dominate. Sudden changes in the behavior of intense fires due to this change in the balance of natural forces cause most of the deaths in forest fire fighting and many failures in the effort to stop the spread of large fires.

Dry east winds periodically bring critical fire danger to the western Cascade slopes of Oregon and Washington. Close studies of frequency and altitudes of these winds make it possible to improve the strategic placement of fire crews and equipment for faster attack on fires in critical situations.

Analysis of large fires of the last 3 years in the West indicates that they spread faster and burn more intensely when the high-level jet stream is somewhere close by. Just what the relationship is between the two phenomena is not known, but research continues on the problem. The effects of low-level jet winds on large fires are also being studied.

Prescribed Burning

The safe use of fire to realize certain net benefits in the management of forest land is known as prescribed burning. Research in burning techniques to realize desired benefits at minimum cost and damage has continued on a limited scale.

Work in selecting weather conditions and ap-

plying burning techniques to eliminate dangerous fuels created by cutting timber is under way in the Northwest.

A new cooperative study was initiated in the Southeast in the use of fire in southern pine timber stands to make it easier to protect them from wildfire and to control undesirable undergrowth.

Another project was set up in Arizona to determine applicable techniques and values of prescribed burning in efforts to convert brush and woodland to grass and other forms of more desirable cover.

WATER RESOURCES

Today's rising water demands make watershed research more urgent. It works to improve soil and cover conditions, thereby alleviating flood and sediment damages and helping to meet the many needs for usable water.

Strip Cutting and Streamflow

Strip cutting in high elevation spruce-fir forests of Colorado was shown to affect streamflow. Preliminary analysis indicates an increase in spring water yield.

Logging Damage

A formula for locating logging roads on steep, unstable slopes promises to reduce damage from harvesting ponderosa pine in southern Idaho. The formula helps foresters determine how wide a buffer strip to leave below a road to protect stream channels from sediment.

Forest Density and Streamflow

Variations in forest density influence accumulation, storage, and melt of snow, and thus affect the amount and distribution of streamflow. Dense coniferous stands above 5,000 feet elevation in the Sierra Nevada contain large openings covered with brush. The study of these openings along with slope and other topographic factors may show how to modify forest cover to increase streamflow.

Stabilizing Sierra Slopes

Research is under way on how to stabilize hazardous mountain slopes above Reno, Nev. Winter floods from rapid melt of deep snow and summer floods from heavy rains are more frequent and violent. Average annual damage exceeds a million dollars. Fires, clear cutting, and overgrazing have depleted the protective vegetation and lowered its value to the region's economy.

Stabilized Gullies Reduce Flood Peaks

Restoration of a badly gullied Piedmont watershed by smoothing, seeding, fertilizing, and mulching produced marked reductions in flood runoff. Maximum summer discharges from heavy rains dropped 75 percent. Lighter rains caused no peaks at all.

NEW AND BETTER PRODUCTS

New products and better service from wood continued to come out of forest products utilization research. Recent developments have stimulated greater use of wood residues and low-quality material and made the commonly used timber more useful.

The dawn of a chemical industry based on wood is at hand—to add to the thousands of products now being made from this universal raw material.

Growing consumption of paper and pulp and a mounting demand for more versatile products have emphasized the value of research in these fields.

Chemicals From Wood

Progress continued on laying the groundwork for a diversified chemical industry based on wood and its residues. Research scientists predicted that in about 10 years wood will be an important source of chemicals. Various lines of research are under way. For example, two processes have been devised for producing glycerin from wood. Basic studies are pointing the way to the production of such chemicals as furfural, levulinic acid, and hydroxymethyl furfural.

Scientists are searching for ways to use lignin, that part of the tree that binds the cellulose fibers together. Lignin, amounting to about 25 percent of the wood, is now largely wasted in the pulping process. Although little is known about the true nature of lignin, there is every indication that, once the mystery is solved, it will prove a fruitful source of chemicals.

Similarly, even the bark of trees, now largely wasted, is being subjected to chemical analyses to see if it can be put to work.

Pulping Wastewood

Much wood residue consists of pieces too small to be ground against a stone as in conventional groundwood pulping. A new process makes it possible to get groundwood type pulp from chips in a disk attrition mill. This also promises to expand the use of wood residues.

Laboratory Aids Navy on New Vessel

Launched this year was the first Navy ship to utilize frames, keel, and other structural members laminated from preservative-treated wood. This was the U. S. S. Bittern, a prototype minehunter. Considerable research at the Forest Products Laboratory and frequent consultations between Navy personnel and the staff were necessary in setting up requirements and technical procedures for fabricating parts.

Better Building Codes

A report published during the year will be valuable to governmental bodies which formulate building codes. "Recommended Building Code Requirements for Wood-Base Materials" com-

bines research results, experience, and general background knowledge of wood in a form which may be used directly by code-writing bodies in setting up requirements for safe and economical wood structures.

Buildings To Resist Earthquakes

Cooperatively with the State of California and the Army Corps of Engineers, a study was completed which established criteria for the design of earthquake-resistant wood structures such as school buildings.

Better Service From Wood

A new double diffusion process of treating cooling towers is expected to save millions of dollars by prolonging the structures' service life. Representing big investments in all parts of the country, the towers often rot quickly. To prolong the life of those already built, more than 60 of them, containing some 12 million board-feet of lumber, were treated. The process causes a highly toxic and permanent compound to form in the wood from the reaction between the two chemicals.

RESOURCE SURVEYS AND ECONOMICS

During the year 17 million acres of forest land (public and private) were surveyed by the nationwide Forest Survey for the first time. Out of a total 780 million acres of forest land in the United States and Alaska, about 522 million acres have now been surveyed or inventoried. Since World War II over 300 million acres have been resurveyed to bring resource data up to date. Survey findings were published in 6 analytical and statistical reports covering States or subregions, 9 statistical reports for counties or county groups, and 30 special reports.

Timber Volume Up, Quality Down

A resurvey of North Carolina showed that forested area has increased about 1 million acres in the 17 years since the original inventory. Timber volume and growth gained substantially, but the increase was in least desirable species and sizes. Thus, hardwood volume expanded about one-third; cull tree volume went up by one-third; overall pine volume remained the same, while pine sawtimber declined 6 percent. Improved management and utilization are necessary if forest industries in this State are to avoid local shortages of the kinds of timber needed for most industrial products.

Techniques Improved

Research to improve forest survey techniques included a new design for continuous reinventories in the Northeast. It involves remeasurement of permanent ground plots, supplemented by interpretation of photo plots with large-scale aerial photography. Tests were continued in the use of helicopters and large-scale aerial photographs.

Price Trends

In response to a section of the Agricultural Act of 1956, a report on "Price Trends and Relationships for Forest Products" was prepared. This gives price information on stumpage, logs, lumber, pulpwood, and other forest products; discusses adequacy of existing price information and ways in which accuracy and usefulness of such data might be increased.

Markets for Wastewood

Possibilities for developing new or expanded markets for little-used species, low-quality timber, and unused residues were explored in several regions where such surplus material may offer potential new forest industries. For example, a recent report, "Industrial Opportunities—Headwaters Timber Development Unit," analyzes industrial possibilities in Idaho, Wyoming, and Utah where timber markets are relatively undeveloped.

Results of economic studies of marketing wastewood from small sawmills were reported in Southeastern Forest Experiment Station Paper No. 84, "An Appraisal of Methods for Salvaging Small-Sawmill Residues in the Southeast." Ten possible methods of salvaging pulpable mill waste were analyzed, and cost analyses provided to determine the most efficient method under different conditions.

RANGE STUDIES

These studies are concerned with the conservation and efficient use of forage, wildlife habitat, and recreational resources of forest and related ranges consistent with timber and watershed values.

Rodents Reduce Forage

Grass stands seeded in 1952 on Utah ranges produced 1,290 pounds per acre on areas where gophers were controlled during a 5-year period, but only 112 pounds per acre on areas where they were not controlled. In California, the significant effect of ground squirrels on range productivity was reflected by an increased weight gain of about 30 pounds by each of 10 yearling heifers for every 100 squirrels removed from the experimental areas.

Southern Forest Ranges

Practical tests in Louisiana continue to show how healthy cattle can be produced on native longleaf pine-bluestem range through good management practices. Studies indicate that moderate to heavy grazing in this type increases forage production and that burning of ungrazed ranges is necessary to remove the rough and rejuvenate herbage growth. New information on native forage nutrition shows that the main forage plants contain ample minor mineral elements; however, supplements high in protein are needed

during fall and winter. Well-managed herds of cattle receiving cottonseed cake and steamed bonemeal produced an 84-percent calf crop and calves averaging 440 pounds at 6 or 7 months of age. By contrast other range herds in the area produced a 50-percent calf crop and 300-pound calves at age 9 months.

Grazing and Pine Reproduction

Damage to longleaf pine reproduction was found directly related to intensity of grazing. With moderate grazing, which utilized 30 percent of the grass, only 9 percent of a stand of planted pines suffered damage. But 60 percent of planted tree seedlings were damaged by heavy grazing which removed 85 percent of the grass. In Alabama, cattle grazing had no noticeable effect on establishment and survival of natural longleaf pine seedlings.

Big Game-Livestock Relations

From a review of regionwide trends, it appears that since the late 1940's estimated grazing use by big game has increased on forest ranges in Oregon and Washington. Analysis of pellet-group counts on the Starkey Experimental Range in eastern Oregon shows total use by deer and elk last year to be about 27 percent of the summer grazing use by cattle. Other findings elsewhere in the West indicate varying degrees of competition between deer and elk and between big game and livestock. This points to a need for additional research to help harmonize the various uses on forest and related ranges.

MANAGEMENT—KEY TO SUCCESS

Forest management research is carried on to find the scientific basis for growing timber as a crop.

Better Trees

One recent accomplishment in forest genetics has been the development of a hybrid of shortleaf and loblolly pine which appears resistant to

fusiform rust, a destructive pine disease. In a test group of hybrids, none had the rust, whereas 68 percent of nearby slash and loblolly was infected.

Genetics Institute

The Northern Institute of Forest Genetics, a branch of the Lake States Forest Experiment Station, was dedicated in June at Rhinelander, Wis. One of three operated by the Forest Service, the institute will work primarily on developing superior strains of spruce for the Northeast and northern Lake States.

More Water for Crop Trees

Research in the South shows that timber growers can make better use of available water by thinning and removing cull trees and undesirable brush. This diverts more of the available water to crop trees and stretches the supply over a longer period of the growing season. It takes 750,000 gallons of water to grow a cord of pulpwood in the mid-South, where an average acre of pine timberland transpires and evaporates about 30 acre-inches of soil water per season. Normally, summer rainfall supplies about half this amount, and water stored in the soil makes up the difference.

Girdling for More Seed

In a test to get more seed from better trees, partial girdling more than doubled cone production on some longleaf pines in Louisiana. Partially girdled 50-year-old ponderosa pines in Montana bore 216 cones, compared with 1 cone on ungirdled trees.

Nursery Handbook

A comprehensive handbook, "Forest Nursery Practice in the Lake States," was published. Into it went results from 25 years of research and practical experience. It covers seed collection, site selection, machinery, tools and specialized equipment, soil management, operational procedures on lifting, grading, packing, storing, and shipping planting stock. Attention is given to insect, disease, nematode, and nutritional disturbances encountered in nursery operation.

National Forest Resource Management

Pressures from a rapidly expanding population are felt all along the line in the management of the Nation's 149 national forests. Located in 38 States, Alaska, and Puerto Rico, the 181 million acres of these Federal forests yield benefits that cannot be measured in dollars alone. Their main resources are timber, water, forage, wildlife, and recreation—all essential to the Nation's economy.

The number of "stockholders" in these public lands—American citizens—is mounting by about 3 million each year; a corresponding economic and

industrial growth means more and more people needing and demanding greater use of their resources. Most significant pressure is noted in the tremendous upsurge in outdoor recreation and the accelerating demand for sawtimber and good usable water.

Managing the national forests to meet increasing use is one of the major responsibilities of the Forest Service. Sustained yield and multiple-use management have been the guiding principles for over half a century. They mean simply that national

forests are managed to provide the greatest benefit to the most people while insuring that the resources are protected and renewed so that future generations may enjoy their abundance.

Management involves protecting the resources from insects, disease, and fire; coordinating the various uses to serve the greatest number of people; improving and developing resources to meet present and future needs.

THE TIMBER CROP

Timber management includes sales, tree planting, providing access roads, and improving stands by pruning, thinning, and other measures.

Volume of timber cut annually on national forests has doubled since 1950. Seven billion board-feet was cut in 1957, with receipts from sales amounting to \$102,779,129. One-fourth of national-forest gross receipts is paid to States for the benefit of counties with national-forest land.

Sales and Trends

In fiscal 1957 there were 31,426 timber sales, compared with 29,288 the previous year. Trend of volume and stumpage value of timber cut from 1910 to 1957 is shown as follows:

Year:	Timber products convertible to board-feet		Forest products not convertible to board-feet (dollars)
	Million board-feet	Dollars	
1910-----	380	906,308	-----
1920-----	805	1,763,927	10,381
1930-----	1,653	4,789,803	22,936
1940-----	1,740	4,806,729	57,425
1943-----	2,359	8,671,729	60,246
1947-----	3,835	16,399,890	182,526
1950-----	3,502	30,714,292	210,763
1953-----	5,160	70,616,025	226,183
1957-----	6,978	115,567,029	311,632

Preliminary award was made for a sale of 6 million cords of pulpwood in the national forests of Arizona and New Mexico. The purchaser plans to construct a pulp mill in Arizona.

Aiding Timber Buyers

Cutting on national forests was down slightly during the latter part of the year, owing to the general slowdown in the demand for lumber. The Forest Service took steps to help timber purchasers through this period. Regulations were revised to permit accepting surety bonds in lieu of cash payment in advance for timber felled but not scaled or removed. This enables contractors to buy timber with less capital in advance.

Reforestation and Stand Improvement

Progress was made in reforesting and improving timber stands, including 85,154 acres planted or seeded directly. In all, about 1 million acres of national-forest land were treated by planting, seeding, thinning, pruning, or some other form of stand improvement.

Advances were significant in developing and using heavy power equipment to prepare sites, such as contour furrowing or benching, disking, and ripping. Despite advance site preparation, western Regions still must hand plant on most areas because of rough terrain; hence there is little immediate chance to reduce costs. Hand planting results in a higher rate of survival, however, and is usually followed by better early growth.

Outstanding records were made by several Regions. Region 6 (Pacific Northwest) planted and seeded 32,231 acres. Region 8 (Southern) planted 19,249 acres—a 52 percent increase over 1956—and did release work in natural stands and plantations on about 322,000 acres—a 27 percent jump over that for the previous year. Up 17 percent was Region 9 (North Central) planting with 16,082 acres, and release weeding, thinning, and pruning were done on 82,583 acres. Summarized data on reforestation and stand improvement for fiscal 1957 follow:

	Acres
Planted and seeded-----	85,154
Other regeneration-----	134,904
Plantation release-----	31,329
Natural stand release, weeding, thinning, cull tree treatment-----	496,941
Pruning and crop tree release-----	144,256
Animal control (mostly fencing)-----	262,789
Rodent control-----	605,132
Disease control (except blister rust control)-----	43,179
Porcupine control-----	40,627

Planting stock produced and distributed at the 12 Forest Service nurseries was used as follows:

National-forest planting-----	42,307,000
Furnished to States and other Federal agencies-----	63,827,000
Total stock produced and distributed-----	106,134,000

There were 6,219,000 seedlings and transplants purchased from State nurseries and planted on national-forest land.

Timber Access Roads

Access roads are essential to make more timber available and bring additional forest areas under more intense management. During 1957 the Forest Service constructed 75 new bridges and built or rebuilt 855 miles of access roads, bringing the total roads constructed since 1940 to 7,544 miles.

Under some timber sales contracts, purchasers construct access roads necessary for their operations. Estimated cost of roads is considered in appraising the value of the timber; thus roads built by operators are built at public expense. Timber purchasers built or rebuilt 2,726 miles of roads in 1957.

New Inventories and Allowable Cut

During the year allowable cut figures were raised for about 200 working circles on the basis of new inventories or estimates of revised inventories. This was possible through improved inventory methods utilizing aerial photographs and statistical sampling.

These increases in allowable cut are significant where the demand for stumpage by established industry is greater than the supply. This is not the case in all working circles; there are still many areas where the full allowable cut is not being sold because the market is not there or the timber is inaccessible.

Revision of inventories and management plans is a continuing project. The objective is to make a new inventory and revise management plans on a working circle about once a decade. This gives fairly current information on growth, economic conditions of the area, and other data on which sales and management programs are based.

WATER FOR A GROWING POPULATION

Lack of water is already a problem in many communities. The population is growing fast; amount of water used by each person is going up; industry, a heavy user of water, is expanding. But basic water supplies remain the same. Therefore, if the demands of a growing Nation are to be met, water resources must be more vigorously protected and developed.

National forests include many of the most important watershed lands in the country. From them comes this vital resource—to irrigate croplands, supply cities and towns, turn the wheels of industry, sustain the deer and elk and other wildlife, and feed lakes and streams for people to swim, boat, and fish in.

Sound forest management is in itself a protection of watersheds. Impact on the watershed of resource uses, such as logging, is considered. In addition, special projects are carried on to maintain good watersheds and improve poor ones: burned areas are reseeded; contour trenching is done to increase infiltration and prevent or check erosion; barren soils are seeded to grass or shrubs through which water can percolate into the soil to be stored; and check dams are built to reduce damage from flash floods.

One of the main reasons for establishing national forests was that of "securing favorable conditions of water flows." Management of these public lands has always included protection of water quality. Now, with the growing need, more attention is being directed toward increasing water yield.

Beaver Creek Watershed

Research has demonstrated that treatments which change the density of forest cover produce changes in streamflow. Evaluation of these treatments was started in 1956 on the 275,000-acre Beaver Creek watershed, a tributary of the Salt River drainage system within the Coconino National Forest in Arizona. Agriculture of the downstream area has suffered critical water shortages.

On the pilot project, efforts are being made to find out how and to what extent streamflow may be increased by various treatments to forest and

range cover. These include thinning commercial ponderosa pine, conversion of noncommercial ponderosa pine to grass, and large area conversions of pinyon-juniper to grass. Fourteen calibrated subwatersheds are planned for this drainage. Already established are 12 recording stream gages and a network of precipitation stations.

These efforts to produce more water are balanced against other uses of the forest within the framework of multiple use, on the principle that it would be unwise to produce a temporary increase in streamflow at the long-term sacrifice of other valuable resources. In line with this principle, other observations are being made on the effects of vegetation thinning upon range, wildlife, recreation, and timber.

Erosion Control

The municipal watershed of Marion, Va., provided an excellent test of the value of erosion control work done there in 1955 and 1956. A storm in January of 1957 brought damaging floods in this region where Virginia, West Virginia, and Kentucky join. In contrast to the flooding of other nearby streams, the flow from the Marion watershed ran clear and stayed within streambanks.

Watershed Improvements

Work done specifically to improve watersheds and restore damaged, eroding lands was extended to include some 90 projects on 65 national forests. In the Piedmont of the Southeast new methods were applied to control and stabilize large gullies. This included a combination of bulldozing, drainage, and revegetation.

Soil-Vegetation Surveys

Soil or combination soil-vegetation surveys were under more intense scrutiny to determine their value to forest and related land management and to find more economical ways of carrying them out. Such work has been done in several regions to meet specific regional needs; new pilot projects were planned to extend the survey work and results Servicewide. Projects which are representative of larger areas have been selected for intensive study in five western Regions. Additional areas will be selected and studied in other parts of the national-forest system during the next few years.

RECREATION FOR MILLIONS

The American people made 61 million recreation visits to national forests in 1957.

Crowded cities—bigger populations, more leisure time, and faster travel—are sending their teeming millions to seek the restoring powers of nature's woods, fields, and streams. A national magazine in 1957 called it a "revolution in American recreation."

National forests, all open to the public, are feeling this recreation pressure. Each year more and more people visit them to hunt, fish, camp, picnic, hike, ride, swim, ski, or just enjoy the scenery.

A steady increase has been evident since 1946. In 1957 the rising curve of recreation use jumped upward to the 61-million figure. This is an un-

precedented increase of 16 percent or 8½ million visits over 1956, and a growth of 195 percent over 1947. During the past year visits totaled 80½ million man-days of use, or the equivalent of almost half the entire population spending one day on national forests.

A comparison of recreation use by activities for 1950, 1956, and 1957 follows:

Primary purpose:	1950	1956	1957
General enjoyment of the forest environment.....	7,969,000	14,190,000	16,634,000
Picnicking.....	6,326,000	12,821,000	14,742,000
Fishing.....	4,885,000	9,499,000	11,000,000
Hunting.....	2,285,000	4,436,000	5,168,000
Camping.....	1,534,000	3,516,000	4,289,000
Winter sports.....	1,517,000	2,673,000	2,760,000
Swimming.....	902,000	1,610,000	1,809,000
Hiking and riding.....	635,000	1,353,000	1,457,000
Organization camping, canoeing, scientific study, hobbies, wilderness, etc.....	1,315,000	2,458,000	3,098,000
Total.....	27,368,000	52,556,000	60,957,000

Operation Outdoors, Part 1

To meet this increasing recreation use, Operation Outdoors, Part 1 started July 1, 1957. This is a Forest Service 5-year program designed to provide sanitation, cleanup, and care at existing recreation areas, maintain and rehabilitate the areas, and provide new areas and facilities as needed to relieve present overcrowding and take care of the estimated 66 million visits expected by 1962.

Progress under the program has been impressive, but has not kept pace with the increased use, which was much greater—8 million more—than had been expected. Estimates for 1957 were 53 million visits, while use reached 61 million.

All existing areas and facilities were kept in satisfactory sanitary condition and adequately maintained. Of the 3,425 recreation sites needing major repair, about 560 have been completely rehabilitated. Almost 700 camp and picnic sites were expanded, and more than 200 new ones developed since Operation Outdoors began.

Development plans for areas and sites have been reviewed, obsolete plans revised, and new ones prepared. This work was done by landscape architects and recreation planners who were trained and directed to modernize the 4,700 campground and picnic areas in the national forests.

1960 Winter Olympics

Negotiations were under way with the State of California on planning and developing the 1960 Winter Olympics site at Squaw Valley on the Tahoe National Forest. A plan was prepared and a special-use permit issued to the State.

New Wilderness Areas

Progress was noted in wilderness preservation. Two new Wild areas were established in Oregon—Diamond Peak and Mt. Washington. Four Primitive areas—Hoover (California), White Mountain (New Mexico), Three Sisters (Oregon),

and West Elk (Colorado)—were reclassified and made Wilderness or Wild areas. In addition, one new Wild area—Jarbridge (Nevada)—was advertised for establishment, and a public hearing was held on one Wilderness area—Tracy Arm—Ford's Terror (Alaska). One large proposed Wilderness area—Glacier Peak (Washington)—was being discussed at the local level.

SPECIAL USES

The 534 resorts, 128 winter sports areas, and 18,461 summer homes under special-use permit supplement free public areas and constitute an important part of national-forest recreation.

Demand for all types of special uses, which include stores, telephone rights-of-way, powerlines, pipelines, TV sites, and organization camps, continues on a steady upswing. Special-use receipts were \$1,189,641 in fiscal 1957, compared with \$1,154,827 in 1956.

Receipts from mineral leases on acquired land were \$843,813—an increase of \$238,948 over fiscal 1956. This shows increased activity in disposing of minerals on acquired national-forest land.

To take care of the greater demand, the scope of term permit authority was enlarged by the act of July 28, 1956. Under the new law, term permits may be issued for 30 years and cover up to 80 acres for a wide diversity of special uses.

Surface Rights

Determining surface rights under the Multiple Use Mining Act of July 23, 1955, continued at approximately the scheduled rate in all western Regions and on the Ouachita National Forest in Arkansas. At the end of 1957 field examinations to determine surface rights had been completed on 196 areas, totaling 21,545,702 acres.

Records of representative counties throughout the West revealed that previous estimates of the number of mining claims filed on national-forest land since 1872 were much too low. It is now estimated that at least 750,000 claims have been

filed on national-forest land. This means that the resulting benefits to resource management will be even greater than anticipated.

A HOME FOR WILDLIFE

National forests provide a home, or habitat, for about one-third of the big-game animals of the country—deer, elk, bear—and for birds and millions of small-game animals and furbearers. These lands are becoming more important to the growing number of hunters and fishermen. Nearly 25 percent of the 61 million recreation visits to national forests were primarily for hunting and fishing. Of equal interest to many other visitors was the opportunity to see and study a wealth of wildlife in natural surroundings.

As shown by the table below, sportsman use of national forests has increased 227 percent since 1947. This is 6 times the overall national trend in total hunting and fishing license sales in the United States for the same period.

	1947	1957	Percent increase
Hunter visits.....	1, 498, 000	5, 168, 000	245
Fisherman visits.....	3, 446, 000	11, 000, 000	219
Total.....	4, 944, 000	16, 168, 000	227

Statewide Agreements

New or revised statewide cooperative agreements were made with Nebraska, South Dakota, and Maine. Agreements had been made or revised with most other States in previous years.

Cooperation by States

State fish and game departments and other organizations stepped up their participation in direct habitat improvement work on national forests. Several additional fishing lakes, numerous streamflow maintenance structures, and other fish habitat projects were built by State agencies during the year. Many food plots, clearings, and water holes were developed and maintained.

Wildlife and Timber Management

The Forest Service through its timber management program is engaged in an extensive habitat manipulation job. During the past year, nearly 1½ million acres of forests were harvested. Almost a million acres were planted, thinned, or otherwise treated. In this work the needs of wildlife for food, water, and cover were considered, and management practices were adjusted in many cases to improve wildlife values.

Statistics are not available from all Regions, but data from Region 8 (Southern) illustrates the amount of wildlife habitat work that can be done as part of or incidental to timber management. In 1957 activities of the 12 national forests of the Southeast included 479,000 acres of timber sales, 305,000 acres of timber stand improvement, and 45,000 acres of prescribed burning.

Many national forests have developed or revised

guidelines to coordinate wildlife needs with timber management. In forests of the Southeast, for example, prescriptions for timber stand improvement include protection and enhancement of wildlife habitat values.

Wildlife habitat management plans were completed for about two-thirds of the national forests, and all are scheduled to have plans completed by June 30, 1959. These include guides for coordinating wildlife values with other resource management activities.

Training

Greater emphasis was placed on wildlife habitat work on all national forests. Several full- and part-time wildlife staff specialists were added to those Regions and forests with heavy wildlife workloads. All western Regions held formal on-the-ground training schools for wildlife and range technicians and unit managers in big-game analysis procedures. Progress was made in coordinating big-game range analysis with livestock allotment analysis.

RANGELANDS

Livestock graze on some 62 million acres of national-forest range part of each year. This is mostly high country range in the West, available from 3 to 5 months a year, but just right to relieve valley ranges on which ranchers run livestock in the spring and fall. Paid permits numbered 18, 752 in 1957. Owners grazed 3,731,823 head of livestock, including cattle, horses, and sheep. The ranges also provide forage for large numbers of big-game animals. Grazing receipts for fiscal 1957 came to \$2,682,349.

Additional permits to graze 240,840 cattle and horses and 88,288 sheep on Land Utilization project lands administered by the Forest Service were issued to 4,877 livestock owners. Grazing receipts on L. U. projects in fiscal 1957 amounted to \$684,102.

The management of rangelands for livestock is coordinated with other resource use, with the aim of producing a continuous supply of forage while keeping the soil productive. More than half the lands produce timber; almost all serve as watersheds and support various game and wildlife.

Range Allotments

Work continued on analyzing conditions and trends of range allotments. This technical job, including among other things preparing management plans and gaining the cooperation of permittees, was stepped up in fiscal 1957 with the increased funds provided. Cooperation of permittees is improving all the time.

Analyses were completed on 710 grazing allotments during fiscal 1957. Many of these were large allotments—50,000 to 100,000 acres—and as a result of analysis they were divided into two or more smaller units. Several Regions devoted most of their range efforts to training personnel in

this work and revising local procedures to bring them into conformity with Servicewide standards. Shortage of range-trained personnel hampers the work. Of the 8,790 national-forest grazing allotments, analyses have been completed on 2,150. Others are in various stages of completion, with the whole program scheduled to be finished in 1962.

Range Improvements

Improvements during the year included the following:

	<i>Fiscal year 1957</i>	<i>Total to June 30, 1957</i>
Range fences-----miles--	241	30,367
Water developments-----number--	307	18,846
Stock driveways-----miles--	17	2,776
Revegetation-----acres--	98,297	868,714

The 98,297 acres which were revegetated were either seeded or treated to remove competing vegetation.

Permittee Cooperation

No figures are available on dollar value of range improvement and maintenance done by permittees; however, it is substantial and is on the increase. Many of those holding grazing permits have done considerable improvement and maintenance work on national-forest lands at their own expense.

FIRE CONTROL—NATIONAL FORESTS

Number of fires on national forests in 1957 dropped 42 percent from the previous year's total, despite growing use of these lands and thus more chance of starting fires. This successful control year was further marked by the absence of deaths due to fire fighting. Figuring prominently in this progress was greater use of aircraft and chemicals.

The year's total of 7,217 fires on national forests and other land within or adjacent to the forests compared to 12,466 the year before—a reduction of 5,249. For the 5-year period from 1952 to 1956 the yearly average was 11,008 fires. During the past year 141,191 acres burned—116,580 fewer than in 1956.

Air Attack

Rapid expansion and considerable success was accomplished in direct attack from the air with water and fire-retardant chemicals in support of ground forces. Sodium calcium borate in water has been the most successful.

Air tankers cascaded about 650,000 gallons of liquid retardant on over 100 fires in national forests of 5 Western States. Results were generally good; many small fires were kept from getting larger, and larger ones prevented from spreading. Use of several larger aircraft such as the Avenger torpedo bomber and the Catalina patrol bomber brought good results.

Most planes were privately owned and used under contract, often adapted from agricultural spray uses. The latest techniques for this work were demonstrated at a western air attack review held at Redding, Calif., in April.

Smokejumpers

Smokejumpers (experienced firefighters who parachute to fires) continued to be one of the most important first attack forces on back-country fires. During the year 1,497 jumps were made to 319 fires.

In addition to regular airplanes, helicopters were used widely. Transporting initial attack forces by helicopter proved successful in several areas and helitack crews were specially trained and strategically located for this purpose. Helicopters flew some 2,000 hours on fire work—in initial detection and attack, laying fire hose, scouting fires, and flying fire bosses while they directed suppression action.

Costly Fires in West

A severe drought continued in southern California through the early fall, and several damaging and costly fires occurred. Nevada and southern Idaho had a critical fire season. A heavy growth of annual grasses and weeds there dried out during long rain-free periods. Fires spread rapidly and gave these areas their worst record in area burned and control costs since 1949.

Cooperating agencies contributed to the good fire record. Military services provided close liaison between their field units and fire control forces. Military men and equipment were used at critical times and gave valuable assistance. The U. S. Weather Bureau improved its services in several areas and provided valuable forecasts on anticipated fire weather. Mutual aid arrangements with neighboring protection agencies proved effective. In southern California, for example, the State, county, city, and Forest Service worked closely on the fire problem, and fires there were fought by these combined forces.

Lands

At the close of fiscal 1957 national-forest and closely related lands amounted to 181,040,533 acres. This figure includes 128,886 acres of experimental areas outside the national-forest boundaries and 134,329 acres of Land Utilization (L. U.)

project and other lands administered in connection with the national forests for many years. It does not include L. U. projects transferred to the Forest Service on January 2, 1954.

The national forests include lands reserved from

the public domain, and lands purchased, acquired through exchange, donated for national-forest purposes, and transferred from other agencies.

Area and origin of national-forest and other lands administered by the Forest Service June 30, 1957, are shown in the following:

	<i>Continental United States (Acres)</i>	<i>Alaska and Puerto Rico (Acres)</i>	<i>Total (Acres)</i>
National forests and related areas:			
Reserved public domain	133, 074, 786	20, 752, 706	153, 827, 492
Purchased for national-forest purposes	18, 397, 260	14, 065	18, 411, 325
Acquired through exchange of public domain national-forest land and timber	5, 673, 093	263	5, 673, 356
Acquired through exchange of national-forest land and timber obtained by purchase, donation, or transfer	1, 107, 489		1, 107, 489
Donated	407, 578	1, 469	409, 047
Transferred from other Federal agencies (except public domain)	1, 606, 667	5, 157	1, 611, 824
Subtotal	160, 266, 873	20, 773, 660	¹ 181, 040, 533
L. U. lands transferred to Forest Service administration January 2, 1954	² 6, 819, 678		6, 819, 678
Total	167, 086, 551	20, 773, 660	187, 860, 211

¹ Includes experimental areas, and L. U. areas administered by Forest Service prior to January 2, 1954.

² Adjusted for changes occurring since transfer.

There was a decrease of about 18,000 acres in the lands administered by the Forest Service in fiscal 1957. Changes are shown in the following:

	<i>Continental United States (Acres)</i>	<i>Alaska and Puerto Rico (Acres)</i>	<i>Total (Acres)</i>
Area as of June 30, 1956	160, 285, 002	20, 773, 680	¹ 181, 058, 682
Increases:			
Purchased	20, 656		20, 656
Conveyed to United States in exchange	59, 739		59, 739
Donated to United States	911		911
Transferred from other Federal agencies	26, 437		26, 437
Reserved from public domain	110		110
Recomputations, adjustments, and miscellaneous	295		295
Total	108, 148		108, 148
Reductions:			
Conveyed by United States in exchange	20, 916		20, 916
Grants, sales, reconveyances, mining patents, homesteads, etc.	9, 220	10	9, 230
Transferred to other Federal agencies	94, 689		94, 689
Eliminated from national forests and returned to public domain status	130	10	140
Recomputations and adjustments	1, 322		1, 322
Total	126, 277	20	126, 297
Area as of June 30, 1957	160, 266, 873	20, 773, 660	¹ 181, 040, 533

¹ Includes experimental areas, and L. U. projects administered by Forest Service prior to January 2, 1954. Does not include lands transferred to jurisdiction of Forest Service from Soil Conservation Service on January 2, 1954.

For more effective management, interforest boundary adjustments were made between the Shasta and Klamath National Forests in California and between the Bitterroot, Clearwater, Lolo, and Nez Perce National Forests in western Montana and northern Idaho.

EXCHANGE

During fiscal 1957, 77 exchange transactions were approved. Of these, 76 were exchanges of national-forest lands for private, State, or county lands within the national forests; the Federal Government received 82,442 acres in exchange for 33,223 acres. These exchanges help to block in national-forest lands and consolidate private properties or State conservation units.

In addition, 45,054 acres of the Los Padres National Forest, Calif., were transferred to the Department of the Army and in exchange 26,117 acres of the Hunter-Liggett Military Reservation were transferred to national-forest status under the act of July 26, 1956.

Recent studies indicate that about 1,885,000 acres of isolated, scattered, or checkerboarded

national-forest land should be exchanged for intermingled private, State, or county lands. This would help consolidate ownership, adjust national-forest boundaries, and meet needs of communities for growing space.

SURVEY OF LAND LINES

An accelerated program to survey and mark property lines between national forests and other lands was started. There are about 226,000 miles of property lines common to national forest and private, State, or other non-Federal lands. Of this, some 153,000 miles either are not marked or posted at all or are unsatisfactorily marked. This complicates and increases cost of national-forest management, invites or leads to trespass and property loss, and often places adjoining landowners at a disadvantage.

PURCHASE

In fiscal 1957, 85 tracts containing 7,342 acres were approved for purchase under the Weeks Law. These included 53 Indian allotment tracts con-

taining 2,930 acres within the Chippewa National Forest in Minnesota. These Indian lands are best adapted to long-term forestry projects. They will help consolidate the national forest. Sale of them will aid the Indians and the Bureau of Indian Affairs in disposing of allotments not useful to Indians. The remaining 32 tracts were purchased to assure rights-of-way, prevent damage to adjoining public properties, reduce fire hazards, protect publicly owned reservoirs, and reduce need for property surveys.

In the Boundary Waters Canoe Area, Superior National Forest, Minn., 32 tracts containing 2,748 acres were approved for purchase. These included several resort and other approved tracts, which impaired the unique qualities of the wilderness canoe area.

In Utah 7,429 acres of land were approved for purchase under the acts of May 11, 1938 and July 24, 1956. This land, within the Cache National Forest, is in a depleted condition from the standpoint of watershed. By good management, satisfactory watershed conditions can be restored.

LAND UTILIZATION PROJECTS

From 1934 to 1942 the Federal Government acquired a considerable acreage of submarginal or depleted land. Good conservation practices have been applied to establish, protect, and develop the forage, timber, and other resources. Prior to 1954 about 1½ million acres had been given national-forest status or had otherwise been assigned to the Forest Service. On January 2, 1954, the other L. U. projects, totaling more than 7 million acres, were transferred to the Forest Service to manage.

Approximately 5½ million acres of these lands are in the Great Plains, about 750,000 acres in the Dust Bowl area of the 1930's. The remainder are in the Far West and in the East, principally in the Southeast. A large portion of them was once in cultivation, but now more than 6 million acres are in grass.

Transfer and Sale

About 800,000 acres of L. U. projects were leased under long-term (99-year) contracts prior to 1954. State agencies administered these projects. In line with Department policy, about 52,000 acres under long-term lease were transferred to State agencies in fiscal 1957. About 9,000 acres have not yet been transferred to States.

All lands transferred must continue to be used for public purposes, and mineral rights are reserved by the Government. Failure to comply with these requirements will result in the land reverting to the Government.

The Department of the Interior has requested

more than 2 million acres of nonleased land; this would be administered by the Bureau of Land Management and by the Fish and Wildlife Service. Eight States have applied for purchase of 387,000 acres; most of this is timberland suitable for wildlife management, recreation, and production of forest products.

During fiscal 1957, 19,442 acres were sold to the State of Arkansas, the first land sale under current policy.

Managing L. U. Projects

The Forest Service manages about 7 million acres of land in utilization projects. Pending determination of which of these projects are to be sold and which held in the Department of Agriculture or transferred to other agencies, their management has been continued without substantial change. These lands are used for grazing, timber production, public recreation, and wildlife habitat, as well as for minerals and cropping, haying, and harvesting grass seed.

About 5 million acres were leased under short-term contracts (10 years or less) to livestock grazing associations, Soil Conservation Districts, and other local agencies. Contracts require that the land and its resources be protected and developed. Major recreational developments are under lease to concessioners, who pay the Government a percentage of their gross annual income. Mineral leases and permits are handled by the Bureau of Land Management, Department of the Interior.

On lands not under lease, forage is made available directly to local livestock owners, under permits regulating use. On lands bearing merchantable timber, trees are marked, advertised, and sold to private operators, largely through competitive bids.

Grazing is the largest use of L. U. lands. Six and one-half million acres are grazed by more than 300,000 head of livestock owned by almost 5,000 permittees. Timber production is the principal use on about one-half million acres; approximately 36½ million board-feet of timber and timber products were harvested during fiscal 1957. Income for fiscal 1957 is summarized below:

Grazing.....	\$684, 102
Forest products.....	215, 120
Mineral leases and permits.....	737, 461
Cropping, haying, and seed harvest.....	38, 063
Recreation.....	30, 084
Other.....	29, 836
Total.....	1, 734, 666

Twenty-five percent of gross receipts from these projects is turned over to the counties in which the lands are located. The money is earmarked for schools and roads.

Administrative Management

Better administrative management was obtained through training programs and improved procedures. Numerous training sessions in many specialized fields were held. General Services Administration delegated authority to the Forest Service to negotiate contracts for professional services needed in planning and developing recreation facilities under Operation Outdoors, Part 1. This authority will help to speed up work on the program.

PERSONNEL

On June 30, 1957, the Forest Service had 10,531 permanent year-long employees and 12,470 temporary seasonal employees.

In 1957, 143 people retired optionally or because they reached mandatory retirement age. They had worked an average of 29.7 years, and their average age was 61.8 years. In addition to these retirements, 47 persons retired on disability.

Training

A student trainee program for foresters was established. The purpose was to better coordinate work-school experience. During the year about 185 men were trained under this program at all forest experiment stations and in all Regions. In addition, about 1,100 students employed during the summer season received on-the-job training. Two university professors made cooperative surveys of student employment and training in Oregon, Washington, and Montana.

Approximately 250 men in 8 Regions received technical training for determining mining claim surface rights. Added emphasis was given to preparing training plans for field and office technicians, to increase Servicewide performance in all phases of forest resource management and protection. Servicewide seminars were carried on in program administration, personnel management, public relations, range and wildlife management, and other technical-administrative functions.

Field trips in selected national forests in Montana were arranged for twenty deans from representative schools of forestry, engineering, and public administration. Purpose of the trips was to increase mutual understanding of student-school-Forest Service training activities.

The Forest Service collaborated with Montana State University in the Twelfth Annual School of Public Administration for resource managers. Alumni, which now number 225 in 22 States, represent 10 conservation agencies and several forest industries.

Meeting the entrance salaries being offered by other employers for college-trained people was becoming more difficult. College graduates in engineering, forestry, research, and business administration are in shortest supply. Technicians and Forestry, Fire, and Engineering Aids are being

used to a greater extent than in past years to stretch out the services of the available professionally trained men and women.

Record Safety Score

The injury frequency rate was down from 9.24 injuries (per million man-hours of work) in 1956 to 8.01 in 1957. Four employees met death on the job, compared with 6 last year. Injury severity was only 722 (man-days lost per million man-hours of work). This is the first year the objective of 1,000 or less has been met.

RECEIPTS AND EXPENDITURES

Receipts from the national forests deposited to the forest reserve fund in fiscal 1957 amounted to \$107,494,932. Sources of the receipts were as follows:

Timber.....	\$102, 779, 129
Grazing.....	2, 682, 349
Other land use.....	2, 033, 454
Total.....	107, 494, 932

Other receipts included \$3,561,732 from national-forest revested Oregon and California Railroad grant lands and \$531,930 from Tongass National Forest in Alaska. Receipts from Land Utilization areas (Title III of the Farm Tenant Act) were \$1,734,666 and other miscellaneous receipts amounted to \$485,338; \$6,217,037 was deposited by cooperators and timber purchasers for work on national-forest programs, of which \$5,560,821 was for timber stand improvement.

Receipts from national-forest resources and Land Utilization projects totaled \$114,464,814 (excluding cooperative deposit investment receipts of \$5,560,821). Operating expenses for national-forest programs and L. U. projects amounted to \$63,709,320, and depreciation on roads, trails, and other improvements was estimated at \$18,463,000. The combined operating receipts exceeded operating expenditures, plus estimated depreciation, by \$32,292,494 for fiscal year 1957.

Expenditures on other programs administered by the Forest Service include \$23,418,214 for State and private forestry programs and \$10,722,919 for forest research activities. Details on cooperative deposits and other nonappropriated expenditures are given in tables 13 and 14 which list receipts by sources, and expenditures by primary purpose of appropriation.

Under the forest reserve fund act of May 23, 1908, 25 percent of national-forest gross receipts is returned to the States, and is used for the benefit of schools and roads within counties having national-forest land. A total of \$26,842,325 was returned to the States under this provision; \$105,474 was paid to Arizona and New Mexico school funds under the act of June 20, 1910; \$47,951 was paid to the State of Minnesota under

the act of June 22, 1948. Counties were paid \$491,389 under title III of the Bankhead-Jones Farm Tenant Land Act, and \$132,982 was paid to Alaska from fiscal 1957 Tongass National Forest receipts under the act of July 24, 1956.

Of the \$3,561,732 receipts collected from national-forest retested Oregon and California Rail-

road grant lands listed above, 75 percent was returned to the counties concerned, as provided for under the act of June 24, 1954.

An additional 10 percent of the base receipts, \$10,737,752, was appropriated to the Forest Service for expenditure on roads and trails within the national forests.

Statistical Tables

TABLE 1.—National-forest and other lands administered by the Forest Service, as of June 30, 1957

States and territories	National forest land	Land utilization projects	Other land ¹	Total
	<i>Acres</i>	<i>Acres</i>	<i>Acres</i>	<i>Acres</i>
Alabama.....	620, 693	10, 777	661	632, 131
Arizona.....	11, 333, 704	-----	52, 604	11, 386, 308
Arkansas.....	2, 361, 881	61, 846	1, 686	2, 425, 413
California.....	19, 939, 878	23, 472	4, 696	19, 968, 046
Colorado.....	13, 728, 000	636, 343	-----	14, 364, 343
Florida.....	1, 074, 214	114, 156	-----	1, 188, 370
Georgia.....	666, 633	116, 653	-----	783, 286
Idaho.....	20, 274, 955	49, 770	-----	20, 324, 725
Illinois.....	210, 850	-----	-----	210, 850
Indiana.....	117, 115	3, 180	-----	120, 295
Iowa.....	² 4, 749	-----	-----	4, 749
Kansas.....	-----	106, 403	-----	106, 403
Kentucky.....	457, 635	-----	-----	457, 635
Louisiana.....	560, 543	31, 155	-----	591, 698
Maine.....	45, 862	725	3, 694	50, 281
Massachusetts.....	-----	-----	1, 651	1, 651
Michigan.....	2, 548, 582	7, 482	-----	2, 556, 064
Minnesota.....	2, 753, 425	-----	-----	2, 753, 425
Mississippi.....	1, 047, 027	85, 518	1, 211	1, 133, 756
Missouri.....	1, 360, 546	12, 938	-----	1, 373, 484
Montana.....	16, 635, 469	1, 935, 853	-----	18, 571, 322
Nebraska.....	206, 082	133, 634	-----	339, 716
Nevada.....	5, 057, 749	-----	-----	5, 057, 749
New Hampshire.....	677, 404	-----	-----	677, 404
New Mexico.....	8, 551, 837	663, 343	8, 850	9, 224, 030
New York.....	-----	13, 747	-----	13, 747
North Carolina.....	1, 122, 852	14, 037	-----	1, 136, 889
North Dakota.....	² 520	1, 103, 359	-----	1, 103, 879
Ohio.....	105, 871	-----	-----	105, 871
Oklahoma.....	181, 860	81, 269	-----	263, 129
Oregon.....	14, 826, 534	105, 925	-----	14, 932, 459
Pennsylvania.....	470, 837	-----	-----	470, 837
South Carolina.....	587, 221	-----	-----	587, 221
South Dakota.....	1, 119, 162	878, 030	-----	1, 997, 192
Tennessee.....	594, 768	1, 212	-----	595, 980
Texas.....	657, 994	124, 795	-----	782, 789
Utah.....	7, 802, 587	53, 404	62, 666	7, 918, 657
Vermont.....	230, 366	-----	-----	230, 366
Virginia.....	1, 444, 689	2, 683	-----	1, 447, 372
Washington.....	9, 688, 965	-----	-----	9, 688, 965
West Virginia.....	903, 136	-----	-----	903, 136
Wisconsin.....	1, 465, 356	-----	17	1, 465, 373
Wyoming.....	8, 566, 134	573, 421	-----	9, 139, 555
Alaska.....	20, 740, 592	-----	-----	20, 740, 592
Puerto Rico.....	33, 041	27	-----	33, 068
Total.....	180, 777, 318	6, 945, 157	137, 736	187, 860, 211

¹ Experimental stations, forests, and ranges.

² Purchase unit, not a national forest.

TABLE 2.—Area of commercial timberland and volume of sawtimber and growing stock in the national forests

States and territories	Commer- cial forest land, Jan. 1, 1957	Saw- timber volume, Jan. 1, 1953	Growing stock volume, Jan. 1, 1953 ¹	States and territories	Commer- cial forest land, Jan. 1, 1957	Saw- timber volume, Jan. 1, 1953	Growing stock volume, Jan. 1, 1953 ¹
	<i>Thousand acres</i>	<i>Million board-feet</i>	<i>Million cubic feet</i>		<i>Thousand acres</i>	<i>Million board-feet</i>	<i>Million cubic feet</i>
Alabama.....	614	1, 512	404	New Hampshire.....	452	1, 661	751
Arizona.....	2, 283	14, 276	2, 727	New Mexico.....	3, 300	8, 620	1, 990
Arkansas.....	2, 293	4, 655	1, 340	North Carolina.....	978	2, 566	708
California.....	8, 463	178, 913	32, 086	Ohio.....	88	187	57
Colorado.....	6, 261	22, 032	6, 570	Oklahoma.....	176	380	95
Florida.....	1, 030	1, 344	525	Oregon.....	10, 662	196, 278	36, 825
Georgia.....	646	1, 577	464	Pennsylvania.....	454	445	245
Idaho.....	10, 857	63, 220	14, 284	South Carolina.....	559	1, 400	472
Illinois.....	184	468	122	South Dakota.....	955	2, 641	1, 027
Indiana.....	112	153	50	Tennessee.....	587	1, 170	350
Iowa.....	3	1	1	Texas.....	640	2, 842	678
Kentucky.....	457	1, 420	380	Utah.....	1, 968	5, 461	1, 407
Louisiana.....	541	871	266	Vermont.....	199	539	238
Maine.....	51	110	49	Virginia.....	1, 285	2, 292	781
Maryland.....	4	8	-----	Washington.....	5, 565	112, 629	22, 869
Michigan.....	2, 347	2, 100	1, 119	West Virginia.....	753	1, 238	658
Minnesota.....	2, 193	2, 433	1, 367	Wisconsin.....	1, 357	1, 119	713
Mississippi.....	1, 025	2, 607	661	Wyoming.....	2, 703	9, 420	3, 150
Missouri.....	1, 339	1, 212	504	Alaska.....	3, 454	82, 524	17, 139
Montana.....	7, 535	32, 954	9, 941	Total.....	84, 676	765, 375	163, 099
Nebraska.....	30	10	48				
Nevada.....	273	87	38				

¹ Net volume of all live trees 5 inches d. b. h. and larger.

TABLE 3.—*Volume and value of timber cut from the national forests, and area planted and seeded to trees, fiscal year 1957*

States and territories	Timber cut		Area planted and seeded to trees	
	Volume	Value	Fiscal year 1957	Total through June 30, 1957 ¹
	<i>Thousand board-feet</i>	<i>Dollars</i>	<i>Acres</i>	<i>Acres</i>
Alabama.....	66,092	1,256,316	651	45,863
Arizona.....	182,975	1,741,445	192	2,957
Arkansas.....	105,879	3,031,272	41	16,268
California.....	975,783	17,612,036	7,947	66,154
Colorado.....	185,130	741,674	359	68,866
Florida.....	82,603	891,265	5,264	22,604
Georgia.....	51,023	1,216,007	5,138	15,313
Idaho.....	611,794	6,146,321	2,013	105,032
Illinois.....	3,794	43,822	2,173	42,203
Indiana.....	1,272	11,745	1,450	19,012
Kentucky.....	17,686	219,440	5	634
Louisiana.....	59,419	863,427	1,375	103,914
Maine.....	1,713	20,631	-----	67
Michigan.....	121,387	695,133	5,449	557,232
Minnesota.....	122,771	508,096	3,162	142,621
Mississippi.....	118,226	2,066,064	6,105	150,131
Missouri.....	28,066	189,001	1,381	67,626
Montana.....	479,156	4,274,949	1,566	45,020
Nebraska.....	2	20	45	30,019
Nevada.....	148	631	45	362
New Hampshire.....	13,310	125,586	-----	1,153
New Mexico.....	85,760	729,885	576	2,976
North Carolina.....	56,033	844,645	2,219	12,382
North Dakota.....	57	630	-----	-----
Ohio.....	2,886	22,960	1,037	12,810
Oklahoma.....	9,009	139,560	-----	57
Oregon.....	1,836,748	43,931,138	20,310	128,604
Pennsylvania.....	16,761	330,443	388	17,897
South Carolina.....	50,788	1,236,162	271	18,490
South Dakota.....	32,849	227,081	841	33,260
Tennessee.....	23,640	428,649	105	5,712
Texas.....	100,414	2,102,770	421	49,426
Utah.....	54,461	379,810	10	4,030
Vermont.....	9,848	187,075	80	1,406
Virginia.....	37,182	325,048	405	4,458
Washington.....	985,869	21,403,867	12,499	141,099
West Virginia.....	26,043	240,971	90	15,933
Wisconsin.....	73,158	375,369	1,430	225,982
Wyoming.....	92,189	422,415	101	7,515
Alaska.....	256,108	580,327	10	10
Puerto Rico.....	153	2,325	-----	12,706
Total.....	6,978,185	115,567,029	85,154	2,197,804

¹ Field surveys of past plantings have resulted in minor corrections in some figures for total acres planted.

TABLE 4.—*Number of livestock permitted to graze on the national forests, calendar year 1957*

States and territories	Cattle, horses, and swine		Sheep and goats	
	Paid permits issued	Livestock	Paid permits issued	Livestock
	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>
Alabama.....	55	876	0	0
Arizona.....	912	142,807	27	81,171
Arkansas.....	140	1,625	0	0
California.....	1,196	109,424	78	104,568
Colorado.....	1,731	148,494	441	501,021
Florida.....	17	1,612	0	0
Georgia.....	13	150	0	0
Idaho.....	1,952	110,804	383	578,947
Illinois.....	18	72	0	0
Indiana.....	4	14	0	0
Iowa.....	7	156	0	0
Louisiana.....	57	1,617	0	0
Michigan.....	55	860	0	0
Minnesota.....	33	328	1	20
Mississippi.....	131	1,842	0	0
Missouri.....	404	3,752	0	0
Montana.....	1,691	115,592	133	193,051
Nebraska.....	53	11,982	0	0
Nevada.....	253	53,517	46	132,763
New Mexico.....	1,794	77,442	129	66,063
North Carolina.....	9	166	0	0
Ohio.....	15	38	0	0
Oklahoma.....	5	20	0	0
Oregon.....	849	72,609	97	133,652
Pennsylvania.....	2	35	0	0
South Carolina.....	11	513	0	0
South Dakota.....	585	21,975	20	12,692
Tennessee.....	12	173	0	0
Texas.....	157	1,416	0	0
Utah.....	2,843	102,288	575	429,920
Vermont.....	5	52	0	0
Virginia.....	10	123	3	106
Washington.....	442	21,204	18	22,313
West Virginia.....	73	765	24	710
Wisconsin.....	18	245	0	0
Wyoming.....	1,020	104,104	205	366,108
Alaska.....	0	25	0	0
Total.....	16,572	1,108,717	2,180	2,623,105

TABLE 5.—*Estimated number*¹ *of big-game animals on the national forests, as of April 30, 1957*

States and territories	Deer	Elk	Bear	Bighorn	Total big game ²
Alabama	5, 200				5, 200
Arizona	98, 000	5, 900	1, 200	35	131, 000
Arkansas	17, 000	80	15		17, 000
California	629, 000	300	16, 000	610	649, 000
Colorado	271, 000	43, 000	7, 300	2, 900	325, 000
Florida	13, 000		320		13, 000
Georgia	6, 600		65		6, 700
Idaho	172, 000	69, 000	12, 000	2, 600	266, 000
Illinois	1, 500				1, 500
Indiana	680				680
Kentucky	2, 000		5		2, 000
Louisiana	2, 600				2, 600
Maine	500		20		520
Michigan	158, 000		3, 500		161, 000
Minnesota	63, 000		3, 600		68, 000
Mississippi	14, 000				14, 000
Missouri	32, 000				32, 000
Montana	217, 000	40, 000	8, 300	1, 400	282, 000
Nebraska	450				450
Nevada	102, 000	530	60	160	103, 000
New Hampshire	2, 200		420		2, 600
New Mexico	92, 000	3, 100	1, 300	55	99, 000
North Carolina	28, 000		980		29, 000
Ohio	2, 400				2, 400
Oklahoma	900				900
Oregon	241, 000	36, 000	8, 900		287, 000
Pennsylvania	43, 000		330		43, 000
South Carolina	5, 200		5		5, 200
South Dakota	75, 000	150			76, 000
Tennessee	5, 500		280		6, 600
Texas	7, 600				7, 600
Utah	275, 000	5, 800	500	10	281, 000
Vermont	12, 000		350		12, 000
Virginia	75, 000	120	1, 800		76, 000
Washington	106, 000	19, 000	13, 000		144, 000
West Virginia	21, 000		270		21, 000
Wisconsin	85, 000		1, 800		87, 000
Wyoming	82, 000	39, 000	2, 000	2, 500	131, 000
Alaska	73, 000	600	20, 000	1, 000	106, 000
Total	3, 030, 000	263, 000	105, 000	11, 000	3, 500, 000

¹ Figures rounded in posting and totals.² Also includes antelope, moose, mountain goat, peccary, and wild boar.

TABLE 6.—*Construction, reconstruction, and maintenance of national-forest (forest development) roads, bridges, and trails, fiscal year 1957*

States and territories	Roads		Bridges, construction, reconstruction, and replacement	Trails		Total obligations from all funds ¹
	Construction and reconstruction	Existing		Construction and reconstruction	Existing	
	<i>Miles</i>	<i>Miles</i>	<i>Number</i>	<i>Miles</i>	<i>Miles</i>	<i>Dollars</i>
Alabama.....	13. 8	1, 328. 7	2			178, 453
Arizona.....	18. 4	8, 892. 5	21		3, 650. 1	673, 716
Arkansas.....	37. 2	3, 944. 0	3			508, 195
California.....	80. 7	25, 491. 8	41	30. 5	16, 594. 6	7, 976, 696
Colorado.....	74. 2	4, 936. 2	50	3. 0	9, 721. 9	1, 451, 565
Florida.....	50. 5	1, 743. 8	2			205, 295
Georgia.....	15. 9	1, 646. 7	1		182. 9	205, 321
Idaho.....	110. 7	10, 876. 9	95	18. 5	22, 696. 6	6, 023, 749
Illinois.....	1. 6	831. 2				62, 541
Indiana.....	. 8	287. 7				6, 623
Kentucky.....	15. 2	566. 7		2. 5	16. 0	193, 964
Louisiana.....	25. 3	1, 158. 4	7			205, 703
Maine.....		46. 1			78. 5	6, 792
Michigan.....	20. 5	3, 436. 5	10			339, 271
Minnesota.....	10. 7	2, 323. 5	12		476. 7	872, 856
Mississippi.....	34. 7	2, 031. 7	3			346, 732
Missouri.....	2. 5	2, 295. 4				131, 944
Montana.....	80. 5	7, 773. 2	60	9. 9	16, 306. 0	2, 770, 129
Nebraska.....		239. 5				5, 274
Nevada.....	2. 5	1, 510. 4	13		1, 739. 0	138, 833
New Hampshire.....		154. 2			1, 068. 7	201, 041
New Mexico.....	24. 4	5, 770. 6	24	1. 0	3, 579. 9	813, 677
North Carolina.....	47. 9	2, 620. 1	5	1. 0	1, 211. 1	344, 790
Ohio.....	2. 8	223. 4				30, 279
Oklahoma.....	11. 4	282. 1				40, 209
Oregon.....	78. 6	16, 259. 0	52	38. 5	12, 200. 6	5, 834, 807
Pennsylvania.....	23. 4	290. 5			167. 8	143, 379
South Carolina.....	51. 8	1, 305. 2	2			177, 711
South Dakota.....	32. 7	1, 623. 3	7		16. 6	204, 389
Tennessee.....	17. 0	1, 118. 4	7		507. 1	236, 040
Texas.....	56. 3	1, 615. 8				255, 894
Utah.....	84. 4	4, 085. 2	16		7, 409. 0	669, 702
Vermont.....	2. 1	165. 7	3		163. 1	135, 892
Virginia.....	15. 0	1, 053. 0	2		787. 8	307, 883
Washington.....	23. 6	6, 397. 0	64	43. 6	9, 522. 3	2, 476, 792
West Virginia.....	4. 1	1, 233. 8	10		767. 9	264, 089
Wisconsin.....	15. 1	1, 757. 2	11			316, 242
Wyoming.....	44. 3	3, 044. 8	28	1. 0	5, 867. 7	934, 644
Alaska.....	3. 0	96. 0	4	1. 0	622. 6	102, 355
Puerto Rico.....		29. 4			20. 3	1, 499
Total.....	1, 133. 6	130, 485. 9	555	150. 5	115, 374. 8	35, 794, 966

¹ Total obligations are for construction, reconstruction, and maintenance.

TABLE 7.—*Use of recreation resources on the national forests, calendar year 1957*

States and territories	Number of visits to—								Total
	Camp-grounds	Picnic areas	Winter sports areas	Organization camps	Hotels or resorts	Recreation residences	Wilderness areas	Other forest areas	
Alabama.....	100	68,000	0	1,100	0	0	0	68,600	137,800
Arizona.....	417,000	1,118,000	125,400	26,100	241,400	22,100	8,900	882,400	2,841,300
Arkansas.....	48,300	255,700	0	19,800	10,100	0	0	928,600	1,262,500
California.....	2,261,300	1,490,800	948,700	242,900	749,200	351,800	182,000	5,038,200	11,264,900
Colorado.....	930,800	1,460,600	336,200	18,100	954,800	48,400	16,700	2,789,500	6,555,100
Florida.....	42,700	364,300	0	42,900	800	8,500	0	330,000	789,200
Georgia.....	70,200	537,500	0	2,600	5,000	3,700	0	349,000	968,000
Idaho.....	420,900	370,100	193,700	20,100	94,700	29,300	30,700	1,097,300	2,256,800
Illinois.....	300	133,000	0	0	0	0	0	220,000	353,300
Indiana.....	300	26,000	0	0	0	0	0	59,000	85,300
Kentucky.....	29,000	162,000	0	2,900	37,000	4,300	0	315,900	551,100
Louisiana.....	0	31,500	0	0	0	7,000	0	106,800	145,300
Maine.....	0	12,000	0	0	400	0	0	25,000	37,400
Michigan.....	59,400	248,000	124,000	11,500	4,500	6,100	0	912,000	1,365,500
Minnesota.....	100,000	87,000	8,700	3,500	88,000	9,300	101,000	762,000	1,159,500
Mississippi.....	3,400	80,500	0	5,000	0	0	0	420,100	509,000
Missouri.....	6,500	53,000	0	800	0	0	0	881,000	941,300
Montana.....	233,400	390,300	60,400	18,800	45,900	52,800	25,800	1,111,200	1,938,600
Nebraska.....	100	39,100	0	0	0	0	0	8,400	47,600
Nevada.....	91,200	134,600	43,500	6,500	0	900	0	104,000	380,700
New Hampshire.....	72,000	310,000	95,000	700	64,000	0	0	780,000	1,321,700
New Mexico.....	277,800	789,800	41,400	17,200	3,200	8,800	14,900	788,700	1,941,800
North Carolina.....	340,100	948,100	0	9,700	40,000	1,900	37,000	1,136,800	2,513,600
Ohio.....	3,500	66,000	0	0	0	0	0	83,000	152,500
Oklahoma.....	100	24,000	0	0	0	0	0	14,200	38,300
Oregon.....	925,000	790,500	399,300	33,400	1,454,300	52,200	27,500	818,700	4,500,900
Pennsylvania.....	2,700	92,000	0	4,200	0	10,000	0	652,000	760,900
South Carolina.....	0	186,600	0	0	0	0	0	103,700	290,300
South Dakota.....	182,300	853,300	0	8,200	9,400	18,000	0	817,300	1,888,500
Tennessee.....	39,000	645,000	0	22,000	41,000	23,000	0	647,000	1,417,000
Texas.....	5,100	99,500	0	1,200	0	0	0	78,000	183,800
Utah.....	582,800	2,583,000	346,800	51,000	64,900	58,600	28,400	913,400	4,628,900
Vermont.....	2,600	49,000	100,000	0	0	0	0	22,000	173,600
Virginia.....	49,000	277,000	0	10,600	0	300	0	1,760,000	2,096,900
Washington.....	531,500	625,000	246,200	46,700	135,600	51,200	8,600	603,800	2,248,600
West Virginia.....	170,500	143,700	0	7,400	0	0	0	430,000	751,600
Wisconsin.....	33,900	121,000	13,200	2,000	300	1,500	0	281,000	452,900
Wyoming.....	352,500	260,200	67,200	23,700	92,000	40,500	53,000	527,200	1,416,300
Alaska.....	67,000	75,000	9,000	1,500	3,200	14,000	0	198,000	367,700
Puerto Rico.....	0	137,800	0	7,000	72,000	4,300	0	0	221,100
Total.....	8,352,300	16,138,500	3,158,700	669,100	4,211,700	828,500	534,500	27,063,800	60,957,100

TABLE 8.—*Fires controlled by national-forest fire organizations to protect national-forest lands, and area burned, calendar year 1957*

States and territories	Fires						Area burned	
	Lightning	Campfire	Smoker	Incendi-ary	Other causes	Total ¹	National forest	Other own-erships ²
	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Number</i>	<i>Acres</i>	<i>Acres</i>
Alabama.....	10	4	25	40	26	105	184	313
Arizona.....	828	50	29	-----	36	943	4, 982	23
Arkansas.....	13	5	13	13	20	64	117	45
California.....	504	69	202	63	321	1, 159	78, 286	10, 531
Colorado.....	73	19	11	-----	15	118	54	1
Florida.....	43	-----	27	17	33	120	2, 828	899
Georgia.....	2	2	6	5	15	30	44	52
Idaho.....	642	27	64	3	32	768	10, 573	2, 379
Illinois.....	-----	4	9	4	26	43	189	399
Indiana.....	-----	-----	2	1	6	9	-----	82
Kentucky.....	2	1	15	3	28	49	82	105
Louisiana.....	1	3	7	23	13	47	380	163
Maine.....	-----	-----	-----	-----	1	1	-----	-----
Michigan.....	5	10	38	-----	87	140	1, 052	683
Minnesota.....	4	20	23	9	31	87	129	362
Mississippi.....	3	1	27	105	32	168	471	299
Missouri.....	2	13	36	58	140	249	842	607
Montana.....	476	35	55	-----	88	654	1, 441	382
Nebraska.....	4	-----	-----	-----	-----	4	3	10
Nevada.....	13	3	3	-----	11	30	12, 932	1, 905
New Hampshire.....	1	1	-----	-----	1	3	8	-----
New Mexico.....	561	8	18	1	15	603	762	105
North Carolina.....	5	4	27	18	25	79	337	797
Ohio.....	1	3	33	10	46	93	48	325
Oklahoma.....	-----	2	1	-----	2	5	2	-----
Oregon.....	416	88	93	1	97	695	614	108
Pennsylvania.....	-----	1	8	-----	2	11	31	5
South Carolina.....	4	4	26	51	22	107	376	318
South Dakota.....	47	5	3	-----	7	62	34	8
Tennessee.....	13	4	11	44	19	91	553	347
Texas.....	-----	2	9	4	13	28	31	20
Utah.....	59	11	14	-----	13	97	210	653
Vermont.....	1	1	-----	-----	3	5	10	33
Virginia.....	10	3	22	10	26	71	423	232
Washington.....	80	53	50	-----	86	269	346	239
West Virginia.....	3	1	5	1	7	17	39	110
Wisconsin.....	2	4	9	3	19	37	62	104
Wyoming.....	83	23	11	-----	10	127	25	-----
Alaska.....	1	17	2	3	6	29	24	23
Total.....	3, 912	501	934	490	1, 380	7, 217	118, 524	22, 667

¹ Includes 5,175 fires on national-forest land and 2,042 on lands in other ownerships within and adjacent to the national forests.

² Within and adjacent to the national forests.

TABLE 9.—*Forest fires on protected State and private lands, and area burned, calendar year 1957; and expenditures for control, fiscal year 1957*

States and territories	Area protected	Fires	Area burned	Prevention and suppression expenditures			
				Federal	State and county	Private ¹	Total
	<i>Thousand acres</i>	<i>Number</i>	<i>Acres</i>	<i>Dollars</i>	<i>Dollars</i>	<i>Dollars</i>	<i>Dollars</i>
Alabama.....	19, 990	4, 060	68, 968	374, 239	667, 651	133, 190	1, 175, 080
Arkansas.....	16, 535	1, 296	13, 267	282, 376	753, 268	86, 407	1, 122, 051
California.....	19, 810	2, 038	110, 182	1, 308, 378	8, 151, 776	-----	9, 460, 154
Colorado.....	7, 404	71	222	29, 800	25, 210	47, 742	102, 752
Connecticut.....	1, 989	1, 054	4, 446	45, 377	186, 347	-----	231, 724
Delaware.....	453	76	161	11, 365	12, 703	-----	24, 068
Florida.....	16, 350	4, 239	67, 158	554, 086	1, 737, 609	223, 118	2, 514, 813
Georgia.....	21, 559	5, 011	60, 894	562, 310	2, 440, 550	35, 275	3, 038, 135
Idaho.....	7, 343	618	110, 582	135, 205	214, 176	114, 329	463, 710
Illinois.....	3, 170	453	4, 018	30, 447	109, 685	-----	140, 132
Indiana.....	3, 931	338	4, 202	46, 852	127, 064	-----	173, 916
Iowa.....	2, 277	9	394	24, 750	29, 051	-----	53, 801
Kentucky.....	7, 286	1, 314	26, 541	107, 553	397, 134	-----	504, 687
Louisiana.....	11, 899	2, 439	38, 595	356, 110	1, 358, 034	7, 419	1, 721, 563
Maine.....	16, 973	726	30, 967	216, 124	743, 183	-----	959, 307
Maryland.....	2, 850	452	1, 563	103, 569	420, 387	-----	523, 956
Massachusetts.....	3, 252	5, 781	26, 967	124, 378	343, 650	-----	468, 028
Michigan.....	17, 205	863	7, 801	434, 916	1, 965, 654	-----	2, 400, 570
Minnesota.....	17, 771	727	18, 161	295, 418	600, 955	-----	896, 373
Mississippi.....	13, 090	5, 137	58, 338	290, 766	1, 261, 232	-----	1, 551, 998
Missouri.....	8, 566	1, 809	18, 648	193, 214	561, 259	-----	754, 473
Montana.....	6, 915	321	1, 381	76, 699	127, 565	149, 506	353, 770
Nevada.....	2, 216	139	25, 825	29, 800	80, 869	-----	110, 669
New Hampshire.....	4, 182	665	5, 658	64, 874	229, 469	7, 522	301, 865
New Jersey.....	2, 095	1, 697	34, 022	96, 884	329, 179	-----	426, 063
New Mexico.....	1, 360	103	35	18, 672	21, 390	-----	40, 062
New York.....	12, 995	1, 757	29, 807	235, 893	890, 834	-----	1, 126, 727
North Carolina.....	16, 810	2, 293	151, 302	324, 131	943, 929	32, 171	1, 300, 231
North Dakota.....	116	45	1, 517	2, 000	2, 001	-----	4, 001
Ohio.....	3, 923	1, 234	7, 091	70, 813	241, 623	-----	312, 436
Oklahoma.....	3, 591	307	17, 457	85, 722	200, 041	18, 366	304, 129
Oregon.....	12, 141	738	8, 582	586, 706	1, 339, 945	807, 468	2, 734, 119
Pennsylvania.....	14, 704	1, 245	36, 973	180, 489	522, 631	-----	703, 120
Rhode Island.....	434	244	1, 143	32, 409	90, 445	-----	122, 854
South Carolina.....	11, 175	3, 246	38, 147	282, 677	996, 843	-----	1, 279, 520
South Dakota.....	2, 827	36	30	24, 850	38, 091	-----	62, 941
Tennessee.....	9, 948	1, 858	12, 775	212, 227	738, 359	3, 240	953, 826
Texas.....	9, 325	689	7, 812	229, 372	559, 376	109, 165	897, 913
Utah.....	6, 161	151	3, 643	29, 800	96, 671	-----	126, 471
Vermont.....	3, 517	238	2, 021	29, 800	54, 018	-----	83, 818
Virginia.....	14, 033	1, 039	3, 570	212, 219	789, 984	4, 178	1, 006, 381
Washington.....	12, 237	847	789	554, 058	1, 796, 201	352, 042	2, 702, 301
West Virginia.....	9, 007	917	24, 822	130, 639	233, 605	17, 878	382, 122
Wisconsin.....	15, 297	1, 156	12, 117	343, 185	1, 358, 063	-----	1, 701, 248
Hawaii.....	1, 152	7	212	4, 500	14, 128	-----	18, 628
Total.....	395, 864	59, 483	1, 098, 806	9, 385, 652	33, 801, 838	2, 149, 016	45, 336, 506

¹ Private expenditures, spent under direct supervision of State Forester, as part of the Clarke-McNary program.

TABLE 10.—*Distribution of forest planting stock by cooperating States, fiscal year 1957*
(under Clarke-McNary program)

States and territories	Seedlings and transplants shipped	Expenditures			
		Federal funds	State appro- priated funds	Receipts from sale of stock used in program	Total cost of program
	<i>Thousands</i>	<i>Dollars</i>	<i>Dollars</i>	<i>Dollars</i>	<i>Dollars</i>
Alabama.....	48,293	19,198	19,198	164,510	202,906
Arkansas.....	18,252	10,199	10,199	61,524	81,922
California.....	¹ 1,229	29,406	41,282	15,189	85,877
Colorado.....	426	3,316	3,316	14,114	20,746
Connecticut.....	722	29,406	33,422	16,250	79,078
Delaware.....	453	6,231	6,760	186	13,177
Florida.....	136,897	0	0	386,376	386,376
Georgia.....	80,836	54,406	70,378	296,865	421,649
Idaho.....	345	6,218	7,705	7,184	21,107
Illinois.....	8,257	0	15,803	134,287	150,090
Indiana.....	6,825	0	25,210	148,478	173,688
Iowa.....	1,284	0	30,862	50,160	81,022
Kansas.....	497	2,864	2,864	18,866	24,594
Kentucky.....	8,929	29,406	32,739	49,169	111,314
Louisiana.....	51,425	29,406	54,471	167,896	251,773
Maine.....	1,013	15,000	19,283	1,782	36,065
Maryland.....	3,106	21,390	21,390	678	43,458
Massachusetts.....	744	13,400	13,400	15,905	42,705
Michigan.....	5,144	11,086	11,087	60,152	82,325
Minnesota.....	14,909	30,906	98,449	89,786	219,141
Mississippi.....	27,701	29,406	109,763	68,539	207,708
Missouri.....	3,377	30,383	31,818	15,999	78,200
Montana.....	550	14,697	14,697	17,856	47,250
Nebraska.....	1,078	1,825	1,825	33,848	37,498
Nevada.....	² 41	0	0	0	0
New Hampshire.....	1,186	13,572	13,572	8,008	35,152
New Jersey.....	731	10,459	10,459	11,151	32,069
New York.....	30,776	38,368	230,097	51,809	320,274
North Carolina.....	46,885	29,406	70,846	193,865	294,117
North Dakota.....	939	8,262	8,262	22,270	38,794
Ohio.....	11,746	29,406	93,108	120,727	243,241
Oklahoma.....	1,945	9,022	9,022	11,099	29,143
Oregon.....	6,592	5,181	5,182	57,664	68,027
Pennsylvania.....	14,126	30,906	55,227	79,197	165,330
Rhode Island.....	153	5,800	9,269	0	15,069
South Carolina.....	54,511	29,406	39,427	149,589	218,422
South Dakota.....	2,195	5,722	5,722	61,057	72,501
Tennessee.....	28,628	21,710	21,711	80,847	124,268
Texas.....	18,346	13,625	13,625	97,911	125,161
Utah.....	¹ 100	4,000	24,999	4,691	33,690
Vermont.....	2,292	23,163	23,163	18,396	64,722
Virginia.....	31,740	38,412	56,935	127,627	222,974
Washington.....	1,325	9,134	10,182	12,348	31,664
West Virginia.....	3,904	20,250	26,433	45,283	91,966
Wisconsin.....	30,949	29,412	183,156	298,216	510,784
Wyoming.....	212	2,442	2,442	5,041	9,925
Hawaii.....	264	29,406	43,407	0	72,813
Puerto Rico.....	435	24,500	24,500	0	49,000
Total.....	712,272	819,713	1,656,667	3,292,395	5,768,775

¹ Includes 13,000 trees from California and 28,000 trees from Utah, shipped for planting in Nevada.

² Distributed to Nevada planters by Utah and California program.

TABLE 11.—*Cooperative forest management accomplishments and expenditures, fiscal year 1957*¹

States and territories	Accomplishments				Expenditures		
	Woodland owners assisted	Woodland involved	Products harvested	Gross sale value	Federal	State	Total
	<i>Number</i>	<i>Acres</i>	<i>Thousand board-feet</i>	<i>Dollars</i>	<i>Dollars</i>	<i>Dollars</i>	<i>Dollars</i>
Alabama.....	172	14, 983	320	11, 010	4, 224	5, 170	9, 394
Arkansas.....	321	44, 184	4, 175	72, 755	22, 518	22, 518	45, 036
California.....	734	123, 838	55, 512	609, 539	17, 009	54, 249	71, 258
Connecticut.....	668	16, 378	1, 408	28, 142	13, 300	18, 280	31, 580
Delaware.....	35	2, 474	6	600	2, 405	2, 458	4, 863
Florida.....	2, 088	928, 077	27, 594	589, 713	40, 768	81, 592	122, 360
Georgia.....	1, 584	226, 838	27, 524	669, 357	35, 090	61, 705	96, 795
Idaho.....	147	13, 536	1, 793	30, 900	3, 599	3, 599	7, 198
Illinois.....	892	21, 977	3, 750	111, 390	30, 274	37, 696	67, 970
Indiana.....	253	10, 915	2, 760	77, 291	12, 952	29, 739	42, 691
Iowa.....	497	18, 089	1, 956	100, 195	10, 017	18, 800	28, 817
Kansas.....	28	2, 052	283	18, 500	1, 990	1, 990	3, 980
Kentucky.....	455	19, 941	2, 037	60, 430	24, 475	26, 487	50, 962
Louisiana.....	166	12, 649	1, 856	30, 184	12, 000	14, 407	26, 407
Maine.....	2, 102	67, 456	20, 372	431, 853	29, 300	48, 228	77, 528
Maryland.....	1, 565	24, 919	8, 013	153, 440	25, 700	42, 323	68, 023
Massachusetts.....	250	11, 047	2, 572	42, 135	6, 230	7, 025	13, 255
Michigan.....	1, 027	16, 429	11, 391	238, 731	34, 465	41, 163	75, 628
Minnesota.....	553	12, 012	4, 449	78, 917	15, 580	17, 636	33, 216
Mississippi.....	424	49, 150	1, 786	42, 016	14, 143	14, 143	28, 286
Missouri.....	1, 232	128, 137	10, 278	288, 329	38, 764	49, 648	88, 412
Montana.....	212	38, 711	5, 123	36, 607	9, 314	10, 827	20, 141
Nebraska.....	90	170	47	1, 880	2, 723	2, 723	5, 446
Nevada.....	3	41, 095	-----	36, 000	2, 308	2, 309	4, 617
New Hampshire.....	1, 757	77, 160	12, 994	305, 215	21, 250	29, 257	50, 507
New Jersey.....	766	40, 439	7, 988	76, 504	15, 700	28, 556	44, 256
New York.....	3, 680	203, 732	63, 955	1, 918, 417	54, 246	125, 786	180, 032
North Carolina.....	1, 375	71, 183	12, 084	419, 944	31, 045	32, 956	64, 001
North Dakota.....	51	878	147	9, 408	3, 597	3, 723	7, 320
Ohio.....	2, 563	50, 165	5, 714	155, 748	29, 914	70, 021	99, 935
Oklahoma.....	133	415	28	1, 361	2, 460	2, 460	4, 920
Oregon.....	1, 137	59, 237	35, 264	1, 026, 456	11, 373	21, 638	33, 011
Pennsylvania.....	1, 200	49, 343	6, 372	143, 260	26, 400	43, 593	69, 993
Rhode Island.....	182	26, 753	47	120	3, 300	3, 570	6, 870
South Carolina.....	998	109, 900	10, 209	249, 773	31, 094	36, 898	67, 992
South Dakota.....	125	6, 785	236	5, 368	5, 216	5, 216	10, 432
Tennessee.....	652	46, 479	17, 745	421, 680	20, 841	22, 028	42, 869
Texas.....	857	82, 622	919	13, 259	15, 112	15, 112	30, 224
Utah.....	9	3, 340	-----	-----	2, 530	2, 531	5, 061
Vermont.....	2, 897	71, 442	16, 462	523, 794	38, 200	67, 338	105, 538
Virginia.....	3, 400	176, 516	124, 297	1, 930, 048	52, 500	142, 715	195, 215
Washington.....	1, 507	60, 183	16, 987	455, 321	14, 092	34, 135	48, 227
West Virginia.....	1, 341	13, 986	1, 909	115, 970	23, 680	32, 682	56, 362
Wisconsin.....	4, 342	90, 243	10, 572	363, 189	47, 355	161, 369	208, 724
Puerto Rico.....	24	285	24	1, 277	7, 000	7, 000	14, 000
Total.....	44, 494	3, 086, 143	538, 958	11, 896, 026	866, 053	1, 503, 299	2, 369, 352

¹ Performed under authority of Cooperative Forest Management Act of Aug. 25, 1950.

TABLE 12.—*Pest control, calendar year 1957*

WHITE PINE BLISTER RUST CONTROL

Ownership or management	Initial work	Rework	Maintenance work	Total worked	Ribes eradicated
	<i>Acres</i>	<i>Acres</i>	<i>Acres</i>	<i>Acres</i>	<i>Number</i>
National forests.....	22, 570	79, 254	31, 020	132, 794	7, 309, 821
Interior lands.....	8, 257	22, 381	4, 084	34, 722	1, 402, 356
State and private.....	82, 367	308, 358	59, 632	450, 357	6, 304, 901
Total.....	113, 144	409, 993	94, 736	617, 873	15, 017, 078

OAK WILT CONTROL

Ownership or management	Area surveyed aerially ¹	Infection centers located	Trees treated	Funds expended		
				Federal	State	Total
	<i>Acres</i>	<i>Number</i>	<i>Number</i>	<i>Dollars</i>	<i>Dollars</i>	<i>Dollars</i>
National forests: Virginia and West Virginia..	806, 000	4	123	1, 388	-----	1, 388
State and private:						
Pennsylvania.....	12, 000, 000	261	2, 375	12, 651	37, 951	50, 602
Virginia.....	7, 000, 000	19	176	1, 245	3, 286	4, 531
West Virginia.....	8, 000, 000	805	889	19, 276	38, 551	57, 827
North Carolina.....	2, 000, 000	29	104	1, 375	5, 425	6, 800
Kentucky.....	6, 000, 000	343	415	4, 641	15, 077	19, 718
Total.....	35, 000, 000	1, 457	3, 959	39, 188	100, 290	139, 478
Total, all ownerships.....	35, 806, 000	1, 461	4, 082	40, 576	100, 290	140, 866

INSECT CONTROL

Ownership or management	Bark beetles		Defoliators		Miscellaneous insects	
	Trees treated	Control costs	Area treated	Control costs	Area treated	Control costs
	<i>Number</i>	<i>Dollars</i>	<i>Acres</i>	<i>Dollars</i>	<i>Acres</i>	<i>Dollars</i>
National forest and other Federal lands..	312, 000	509, 685	1, 402, 959	1, 624, 000	11, 300	23, 162
State and private lands.....	14, 600	34, 355	93, 447	96, 000	15, 600	4, 092
Total.....	326, 600	544, 040	1, 496, 406	1, 720, 000	26, 900	27, 254

¹ Some areas were resurveyed.

TABLE 13.—Statement of Forest Service receipts and expenditures for national-forest programs and land utilization projects, fiscal year 1957

Item	Receipts	Expenditures ¹	
		Operating	Investments
National-forest protection and management and land utilization projects		\$37, 717, 286	\$5, 769, 640
Fighting forest fires		9, 659, 620	
Blister rust control		1, 574, 203	5, 980
Forest pest control		2, 556, 780	6, 219
Cooperative range improvement		404, 271	302, 856
Road and trail system—construction and maintenance		10, 508, 629	24, 947, 487
Acquisition of land		19, 832	409, 503
Flood prevention and watershed protection		603, 748	522, 609
Cooperative deposits (including timber deposits for stand improvement)	² \$6, 217, 037	664, 951	7, 433, 912
National forest and land utilization area receipts:			
Forest reserve fund	107, 494, 932		
Oregon and California lands (national forest)	3, 561, 732		
Tongass National Forest, Alaska	531, 930		
Land utilization areas (Title III, Farm Tenant Act)	1, 734, 666		
Other miscellaneous receipts	485, 338		
Totals	³ 120, 025, 635	⁴ 63, 709, 320	39, 398, 206
Less cooperative deposits and investment receipts	5, 560, 821		
Total operating receipts and expenditures	114, 464, 814	\$103, 107, 526	

¹ Expenditures are on an obligation basis.

² Operating \$656, 216
Investment 5, 560, 821

Total 6, 217, 037

³ This does not include amounts collected by Federal Power Commission for power licenses and by Department of the Interior for mineral leases on public domain national-forest lands.

⁴ Operating expenditures \$63, 709, 320
Estimated annual depreciation on roads, trails and other improvements in place on
June 30, 1956 18, 463, 000

Total \$82, 172, 320

Amount by which receipts exceed operating expenditures plus estimated depreciation 32, 292, 494

TABLE 14.—Statement of Forest Service receipts and expenditures from all sources, fiscal year 1957

Item	Receipts	Expenditures ¹
National forest programs-----	\$120, 025, 635	\$103, 107, 526
Research programs:		
Forest research-----		9, 907, 033
Cooperative deposits-----	849, 942	815, 886
Total-----	849, 942	10, 722, 919
State and private forestry programs:		
Cooperation with States-----		12, 174, 059
Soil bank program-----		7, 632, 263
Forest pest control-----		253, 012
Blister rust control-----		636, 268
Flood prevention and watershed protection-----		1, 055, 968
Forest fire prevention—Smokey Bear-----	15, 585	² 19, 472
Cooperative deposits-----	1, 542, 860	² 1, 647, 172
Total-----	1, 558, 445	23, 418, 214
Work for others:		
Forest pest control (Interior Department lands)-----		92, 924
Blister rust control (Interior Department lands)-----		61, 329
Cooperative deposits-----	1, 594, 547	² 1, 636, 975
Brush disposal-----	2, 873, 212	² 4, 147, 244
Other services (funds reimbursed by others)-----	4, 200, 899	² 4, 730, 704
Total-----	8, 668, 658	10, 669, 176
Total, receipts and expenditures-----	131, 102, 680	147, 917, 835
Servicing operations primarily derived from charges to Forest Service programs-----	8, 866, 569	8, 557, 854
Portions of receipts distributed to States, territories, and counties as directed by Congress:		
Forest reserve fund (act 5/23/08)-----		26, 842, 325
Arizona and New Mexico school fund (act 6/20/10)-----		105, 474
Tongass National Forest, Alaska (act 7/24/56)-----		132, 982
State of Minnesota (Superior National Forest) (act 6/22/48)-----		47, 951
Title III, farm tenant land (act 7/22/37)-----		³ 491, 389
Total-----		27, 620, 121
Grand total-----		184, 095, 810

¹ Expenditures are on an obligation basis.² Includes expenditures from prior year funds.³ Covers distribution against calendar year 1956 receipts.

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